

# COMPUTERWORLD

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## Programmers, Analysts Getting 5% More This Year

By Marcy Rosenberg  
CW Staff

WILLOW GROVE, Pa. — Average weekly salaries for programmers, programmer/analysts and systems analysts rose 5% to 6% from last year's national means, according to the Administrative Management Society (AMS) salary survey for 1979-1980.

Findings showed that as of Feb. 2, 1979:

- Programmers earned an average of \$292/week, up 6.1% from \$275 in 1978.
- Programmer/analyst salaries climbed 5.4% from \$335/week last year to \$353 in 1979.
- Systems analysts earned 5.5% more this year, pulling down \$399/week compared with \$378 in 1978.

These results, just released by

AMS, were based on a survey of 6,031 U.S. and Canadian companies with a total of 523,571 employees (only those figures relating to U.S. firms are presented here). Besides compiling salary figures for various job categories, AMS further broke down its results by geographic region and by type of business.

Companies in the western U.S., for example, pay higher salaries to programmers, programmer/analysts and systems analysts than firms in any other region. Average weekly salaries in the western region are \$320 for programmers, \$378 for programmer/analysts and \$411 for systems analysts.

As defined by AMS, the western region includes California, Idaho, Colorado, Oregon, Arizona, Nevada, Utah, Washington and parts

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## IBM May Face Charges Of Restricting Trade In the Common Market

By Rex Malik  
Special to CW

BRUSSELS — The European Economic Community (EEC) is considering a formal complaint charging IBM with anticompetitive practices in the nine Common Market countries.

The complaint was filed by Memorex S.A., a wholly owned subsidiary of Memorex Corp. in the U.S. It will force the EEC's Directorate General for Competition to take action in its long delayed investigation of IBM marketing practices.

The directorate, which has been conducting an internal investigation of IBM since 1974, recently said it would probably start formal proceedings against the firm this summer. How-

ever, the directorate now must also take action on the Memorex complaint.

Under the regulations here, the directorate has to answer the Memorex complaint by either bringing the suit against IBM on the grounds outlined in the complaint or by rejecting the suit.

If it takes on the Memorex charges, a trial would be held in the highest European court. If the directorate rejects the Memorex charges, then Memorex can appeal directly to that court.

### Charges Not New

While charges in such complaints are normally kept secret, *Computerworld* has obtained a copy of the Memorex filing. The charges themselves are not new, but they are much more limited and more focused than the Memorex antitrust suit against IBM in the U.S. and the overall EEC investigation of IBM.

Basically, Memorex is charging that "IBM manipulates the interfaces between the components of computer systems and conceals the technical specification for those interfaces for the purpose and with the effect of preventing competitors from attaching their components to IBM systems."

Memorex had offered to enter into an interface licensing scheme with IBM in which IBM would receive royalties for providing Memorex with interface information.

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## Wastes Propellant Correcting Error Nasa Jumbles Skylab Flight Data

By Tom Henkel  
CW Staff

HUNTSVILLE, Ala. — Add jumbled data to the list of problems the National Aeronautics and Space Administration (Nasa) is having with Skylab, the 77-ton former space station expected to reenter the Earth's atmosphere sometime this week.

Nasa flight controllers recently fed the information controlling the attitude, or position, of Skylab into the computer in the wrong order — back-

ward. When Skylab's on-board computers tried to adjust the flight path to erroneous parameters, the vehicle started to wobble in space.

To fix the error, Nasa was forced to waste 1,000 pounds of the precious nitrogen propellant it had been saving for a possible last-ditch attitude change to avoid reentry over densely populated areas.

Nasa discovered something was wrong when a tracking station in Madrid reported that Skylab was not behaving as it should.

"We saw the vehicle was moving away from our key attitude. We started researching and found that when [the flight controllers at Nasa's Houston Flight Center] generated the commands, they got them inverted.

"So we had to reinitialize the control system and get everything back to the preinitialization point," according to Dr. Herman Thomison, who is on special assignment to direct computer simulations for Nasa at the Marshall Space Center here.

### Reentry Date Unaffected

The error did not affect Skylab's scheduled reentry date, which Nasa said will be late July 11 or early July 12. Losing the 1,000 pounds of nitrogen made Nasa scientists monitoring Skylab a little uncomfortable, however.

The nitrogen jets, which can rotate Skylab in any direction, are the only means Nasa has of altering the drag. "By reducing the drag for a number of orbits, you can allow the vehicle to fly four or five orbits longer" — possibly

long enough to avoid densely populated areas like India or China, according to Richard Smith, Nasa's deputy associate director.

After using 1,000 pounds of nitrogen to correct the input error, Skylab still has about 5,500 pounds aboard. Thomison said that should be enough to successfully carry out a last-ditch attitude change, although he felt more comfortable with 6,500 pounds of nitrogen aboard.

(Continued on Page 4)

## 'Automath' Eases Fortran Jobs For IBM Sites

By Brad Schultz  
CW Staff

WATERTOWN, Mass. — The need for Fortran programmers on the staffs of large, scientifically oriented IBM users is said to be virtually eliminated by an "algebraic programming system" available from Odyssey Systems, Inc. here.

Odyssey's Automath package applies techniques of artificial intelligence to very difficult but common problems in scientific computing, an Odyssey spokesman said. With a few English commands, the operator can have a complicated algebraic or differential equation displayed and solved for any particular variable within seconds, he claimed.

Moreover, without knowing Fortran, (Continued on Page 8)

## Decade After Unbundling, User Values Independence

By Don Leavitt  
CW Staff

GREENSBORO, N.C. — In the decade since IBM announced its intention to unbundle — charge separately for — its "program products," many installations have recognized value in acquiring software from outside sources. Few, however, illustrate a willingness to go the packaged route better than Carolina Steel Co.

The company has nearly a dozen packages from at least five different vendors, all intended to drive a pair of IBM 370/135s more effectively as they support 11 fabricating plants throughout the Southeast.

It's not that Harry Parrish, manager of information services, or Charlie Rice, manager of programming and technical support, can't visualize what they need and have the tools built in-

house. Heck, four years ago they had an on-line program development system up and running in their DOS/VS environment, long before any vendor serving the IBM marketplace had such an offering.

But Parrish and Rice are practical people. They go after packages with two goals in mind: either to help the DP function itself or to help the 10 people on the systems and programming staff do their jobs better.

Parrish is a long-time — "six years, maybe more" — user of the Westi teleprocessing monitor from Westinghouse Electric. The monitor is currently supporting 52 CRT terminals, half local and half remote, and nine printers, eight of which are remote. The system handles 45,000 transactions a day with a response time of less

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# GAO Cites DP Management Flaws

## NBS Charged With Inadequacies

By Connie Winkler

CW Staff

WASHINGTON, D.C. — Turnabout is sometimes fair play, as the federal agency in charge of setting computer standards for the rest of the government discovered recently when it was severely chastised for failing to follow some of the rules it tries to impose on others.

The National Bureau of Standards (NBS) needs to upgrade its 12-year-old Univac 1108 hardware, improve software support, beef up security, establish a long-range DP plan and generally do all of the things about which it advises other agencies, according to a study of NBS conducted by the General Accounting Office (GAO).

NBS "computer resources are not fulfilling the needs of many administrators and scientists who depend on these resources," the congressional watchdog agency said in its report entitled "National Bureau of Standards Needs Better Management of Its Computer Resources to Improve Program Effectiveness."

Even though NBS sets DP standards for the government and in general advises other agencies on computer operations, the GAO study on the bureau reads more like a casebook of how not to run a large computer installation.

NBS was established in 1901 to set standards for physical measurements, determine properties and test methods and provide advisory services to other government agencies. The bureau's Institute for Computer Sciences and Technology was specifically chartered with developing federal DP standards and aiding federal agencies in selecting, acquiring and using computer technology.

But, since as far back as 1970, NBS has been concerned that it is behind other laboratories such as the Argonne National Laboratory in Argonne, Ill., in applying modern computer technology to its scientific work.

Today's scientific standards require that NBS scientists use computers to control experiments, record and ana-

lyze data and calibrate equipment. For instance, NBS uses computer modeling to simulate fires in particular buildings and determine how fast they would spread. NBS also simulates energy consumption of specific buildings to determine the most energy-efficient design.

To do all this, the bureau has a centralized computer operation built around the Univac 1108, which is limited by 262K bytes of core memory and 300 interactive terminals at its Gaithersburg, Md., location, and a 10-year-old Control Data Corp. 6600 at its Boulder, Colo., location. (The Boulder site is shared with the National Oceanic and Atmospheric Administration, the prime user of the 6600.)

The bureau also uses many minicomputers to control experiments, collect data 24 hours a day and analyze the data. However, no one can agree on how many minicomputers there are: NBS identified 63, but GAO's interviews revealed 100 to 120 valued at \$4 million to \$6 million.

## Users Lack Support

It has been estimated that NBS spends \$20 million annually, or 14% of its budget, on computer resources, including \$4 million for computer research with the Institute for Computer Sciences and Technology. According to the 52-page review, NBS should:

- Define and quantify its DP objectives. Is NBS simply to provide adequate computer resources for its scientists, or should it become a model research organization in the use of computers?

- Conduct a requirements study and submit requirements reports in compliance with federal specifications — many of which NBS has developed.

- Upgrade its interactive mainframe hardware.

- Place improved management controls on computer resources. GAO, in its own door-handle test, found that in 22 of 27 laboratories with computer equipment rooms which were sup-

posed to be locked were not.

- Institute a formal long-range planning process to help acquire, manage and use its computer resources.

- Establish a central computer management office. Indeed, GAO even provided an organization chart showing where the computer management office would be located in the chain of command and what duties it would perform.

## CPU Problems

Use of the 12-year-old Univac CPU causes major problems, GAO found. In some scientific interactive applications, users get response times in minutes rather than seconds and even batch processing cannot be turned around overnight. Because of delays in batch processing, one NBS engineer claimed he was operating at only 25% effectiveness because he had to wait days before he could get, and then act on, computer results.

The Univac 1108, installed in 1967, intended was to be used for eight years, but the earliest possible replacement date is now 1982 — about the same time Univac's hardware and software support will stop. The 1108 can operate at only one million instructions per second.

## Limitations

These hardware limitations mean more expensive computer time must be procured externally, work is deferred or not performed or experiments and analyses are scaled to fit the NBS computer — thereby allowing for greater error in the experiments.

GAO found control problems with software security, documentation, software inventory, payroll processing and disaster recovery procedures, physical security for minicomputers and protection for computer assets and computer data. The two problems here are a lack of central management responsibility for controls and insufficient management involvement with controls and associated documentation.

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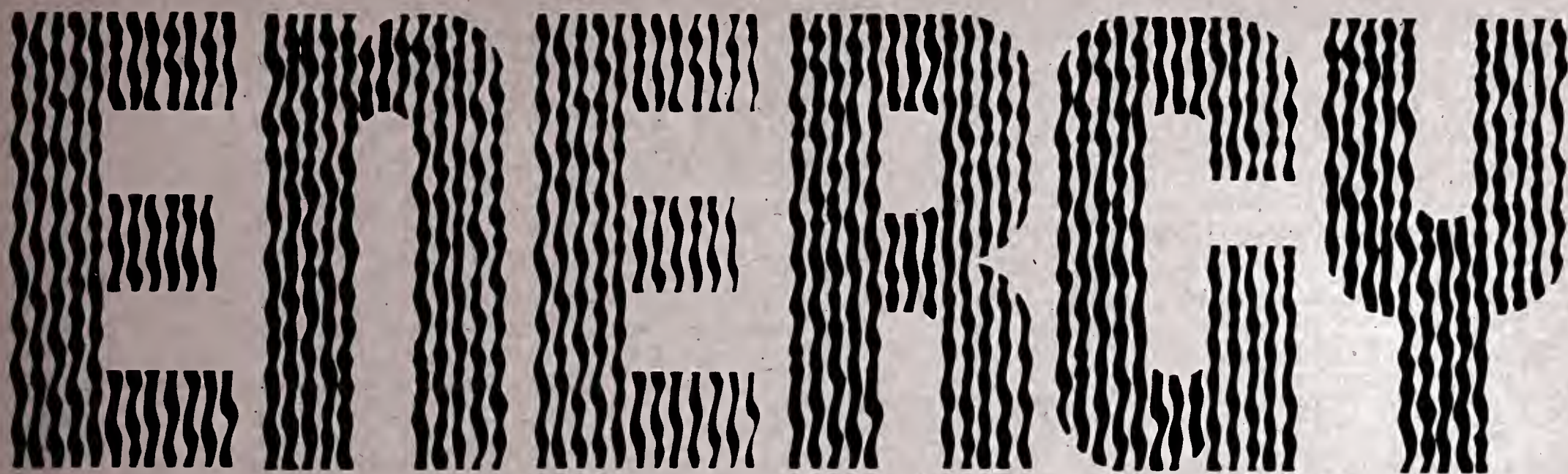
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# Wrong Reentry Date Blamed on Miscalculations

By Tom Henkel

CW Staff

COLORADO SPRINGS, Colo. — Miscalculations of sunspot activity have been blamed for expectations that Skylab would reenter the atmosphere later than it actually will.

What went wrong? Well, if you ask the National Oceanic and Atmospheric Administration (Noaa), the government agency responsible for keeping track of sunspots, nothing really went wrong. It's just tough to predict nature.

But Noaa isn't sure whether the miscalculations were just that — miscalculations — or whether something quirky had indeed occurred in nature because it hasn't been in the business of sunspot forecasting long enough.

The National Aeronautics and Space Administration (Nasa) asked Noaa to start predicting solar activity about 10 years ago. Using a technique left over from World War II, Noaa attempted to make a long-range prediction of solar activity.

"The techniques are relatively simple. You look at the 100-year record of sunspot numbers and a few other parameters they started observing 100 years ago," according to Tom Gray, chief of the Services Department of the Space Environment Laboratories, a division of Noaa.

"A cycle is about 10 to 11 years long. If you're talking about predicting the next cycle, you have only 10 events [to look back on]," Gray said.

The idea behind making the long-

range forecast was to predict how the cycle would behave over the next 10 years. This included a forecast of the time the sun would be at its maximum and minimum activity.

"There was no general interest in predicting maximum sunspot [activity] ahead of time until the last cycle, which was 10 years ago," Gray said, "so no one really stuck their neck out on the last cycle."

"There's an old technique called the McNish-Lincoln technique that we run here on our [Control Data Corp.] 6600. For the kind of accuracy anyone required, it had been used to put out forecasts for the next cycle."

Gray compared the sophistication of attempts to calculate sunspot activity with the state of meteorology about 30 years ago.

"There was no need for accurate long-term forecasts, and no one knew how to use them," according to Gray. "Luckily, using the old technique, we've been quite accurate so far."

"What went wrong? God and the sun

got together, and Murphy [of Murphy's Law fame] was in there too. This cycle looks like it's going to be a big one. It came up fast, the density [of gas around the Earth] rose and the lifetimes [of objects in orbit around the Earth] were shortened," Gray said.

"There's a great deal of variability in sunspot cycles from one cycle to the next."

"It's generally agreed that to maintain the highest possible objectivity, Noaa will assume the responsibility for long-term predictions. Once we put out the sunspot numbers, then they go various places where they are used in models that are equally crude [in comparison with the McNish-Lincoln technique]," Gray stated.

"There have been programs around [to calculate sunspot activity], but need on the last cycle was small. So one was put out and everyone said, 'Well, it's not very accurate, and we know it's not very accurate, but it's probably as good as we need,'" Gray said.

The McNish-Lincoln technique was developed in response to wartime needs for long-range radio propagation forecasts.

"We make a short-term daily forecast, but it's sort of like forecasting it's going to be cold in December and January."

"You can make that kind of forecast with some kind of confidence because the cycles range from high to very low. So you know there's going to be one, just like you know there's going to be winter," Gray continued.

Noaa recently added another technique to the McNish-Lincoln method to make its predictions a bit earlier.

"The Ohl-Sargent technique simply looks at the next cycle, based on a knowledge of where the minimum [sunspot activity] is. The McNish-Lincoln works once you've moved into the new cycle," Gray explained.

The Ohl-Sargent technique is a statistical calculation that can be done on a Hewlett-Packard Co. 65 hand-held calculator.

## Nasa Center Jumbles Skylab Flight Data

(Continued from Page 1)

The inversion of the input occurred in three sets of parameters for the second-order differential equations used to calculate the slope matrix of Skylab. As altitude decreases and solar activity changes, Nasa has to update the information stored in Skylab's on-board computers, specially designed for Nasa

by IBM.

The parameters were calculated on a simulation package developed on a Honeywell, Inc. Sigma V mainframe. The simulation speeds up Skylab's descent — it normally takes about 90 minutes for Skylab to orbit the Earth — to see how it will react in the future.

After the parameters are determined at the Marshall Space Center, they are sent to the Houston Space Center, where they are transmitted to Skylab.

The Houston flight engineers were given a table of coefficients to transmit to Skylab. "We briefed them, but there was a slipup in communications," Thomison said. Now, "we double check [the coefficients] before they go in. Instead of giving them a table, we give them a listing: one, two, three and so on down the page."

So far, the system seems to be working. Thomison said Houston transmitted a new matrix last week that put Skylab in a more stable position.

"It takes much more management in this attitude because we're now in a lower density and we get the full effects of aerodynamic torques. It's really an unstable attitude from an aerodynamic standpoint," according to Thomison.

Nasa changed Skylab's attitude June 20 in hopes of gaining more control in the last hours before reentry. The June 20 maneuver put Skylab broadside into its orbit.

"We don't have enough experience. We've never flown a vehicle in this attitude before. We're really learning as we're doing."

"As soon as data comes in from each of the [90-minute] passes, we plug the data into our Sigma V simulator to determine what's going to happen in the next 90 minutes," Thomison said.

### Looking Toward Landing

While Nasa uses its simulations to determine how Skylab will react, the North American Air Defense Command (Norad) is using simulations to determine where it will land.

Until the end of June, Norad was using a long-term simulation package called DK-Sim on its Philco Corp.

2000 mainframe. When Skylab was 20 days from reentry, Norad switched to a spiral decay simulation to get more accurate predictions of possible orbits for reentry.

Both simulations use a Monte Carlo-type method of numerical integration to determine a probability distribution of reentry points using random inputs.

"The major difference between the two programs is that DK-Sim uses predictions of solar activity as an input, while the spiral decay program takes as an input current solar activity values and the history of solar activity over the past 30 days. The spiral decay program assumes solar energy will be constant up until the time the object decays," according to Lt. Col. Terrence O'Rourke, chief of Norad's Technical Data and Support Division.

"We won't be able to put out specific locations for impact until we're just a few hours away from decay time, because the uncertainty associated with the prediction is too large. At the 20-day point, uncertainty is plus or minus four days."

"It becomes trivial to talk about location. Even at the one-day point, there's too much uncertainty to say where [Skylab's] going to come down," O'Rourke said.

However, Nasa plans to restrict air traffic for 20-minute intervals over potential reentry points for 48 hours before reentry. A Nasa spokesman said the airways that will be affected cannot be determined until Nasa can determine on which set of orbits Skylab will enter the atmosphere.

Once it is known which airways are likely to be affected, those airways may be closed several times in the 48-hour period, the spokesman continued.

When Skylab does come through the atmosphere, it will spread approximately 500 pieces of debris over a 100-mile-wide by 400-mile-long "footprint."

Nasa said an individual's chances of getting hit by a piece of Skylab are slim — about one in 600 million. The airways will be restricted as a precaution.



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# Danger From Falling Skylab Small, Nasa Says

By Tom Henkel

CW Staff

WASHINGTON, D.C. — With Skylab scheduled to reenter the Earth's atmosphere any day now, perhaps you're a bit hesitant to look up, fearing something may be gaining on you.

According to the National Aeronautics and Space Administration (Nasa), your chances of being hit by a hunk of Skylab are slim — approximately one in 600 million.

That means 150 Skylabs would have to reenter the Earth's atmosphere at the same time before there would be a good chance of incurring one casualty, according to Richard G. Smith, Nasa deputy associate administrator.

Since most of the Earth's surface is water, Nasa is betting Skylab will fall into the ocean. In that case, the chances of being injured would be about nil.

If Skylab should fall over land, your chances are still nil, since much of the land surface is not densely populated.

Of course, the odds of being hit will increase for some people in the final hours before reentry, when Nasa can better predict where Skylab will crash. The odds for the rest of the population will then be reduced to almost zero.

## Under the Footprint

But even if you find you're among those caught under the 100-mile-wide by 400-mile-long "footprint" of Skylab debris, your chances of remaining unharmed are still good.

Smith said more than half of the 77-ton Skylab will burn up before it finishes piercing the atmosphere. About 500 pieces big enough to do damage are expected to get through. However, Smith said he expects the actual number to be far less than the official Nasa estimate.

Perhaps the biggest danger — and it's not really that big — will occur after the fact. Pieces of the glass used to cover Skylab's solar panels are also expected to come through the atmosphere. Because of their shape, Smith said, they will probably fall to Earth in a leaf-like fashion.

So the danger of being hit by one is not as great as stepping on one later. Again, Smith said the chances of that occurring are also slim.

An estimated three pieces of Skylab will fall for every 100 square miles under the footprint, Smith said.

## Dodging Bullets

Another factor in your favor is the speed at which the debris will fall. Since most of it is irregularly shaped, it won't be going very fast.

"We think the top speed of any object will be 260 to 270 miles per hour," Smith said.

Even if you're unlucky enough to be hit by a piece of Skylab — say a small metal fragment — Smith said it wouldn't be any worse than a bullet wound. Granted, being shot may not be your idea of fun, but being hit by a piece of Skylab does not necessarily mean instant death.

"Two things determine the risk," Smith said. "Is it heavy enough to cause damage? And what is its surface area?"

Approximately 10 of the 500 pieces expected to be heavy enough and big

enough to cause damage will weigh more than 1,000 pounds. Two of the pieces, one a steel airlock and one a lead film cannister surrounded by heavy-gauge aluminum, weigh about two tons each.

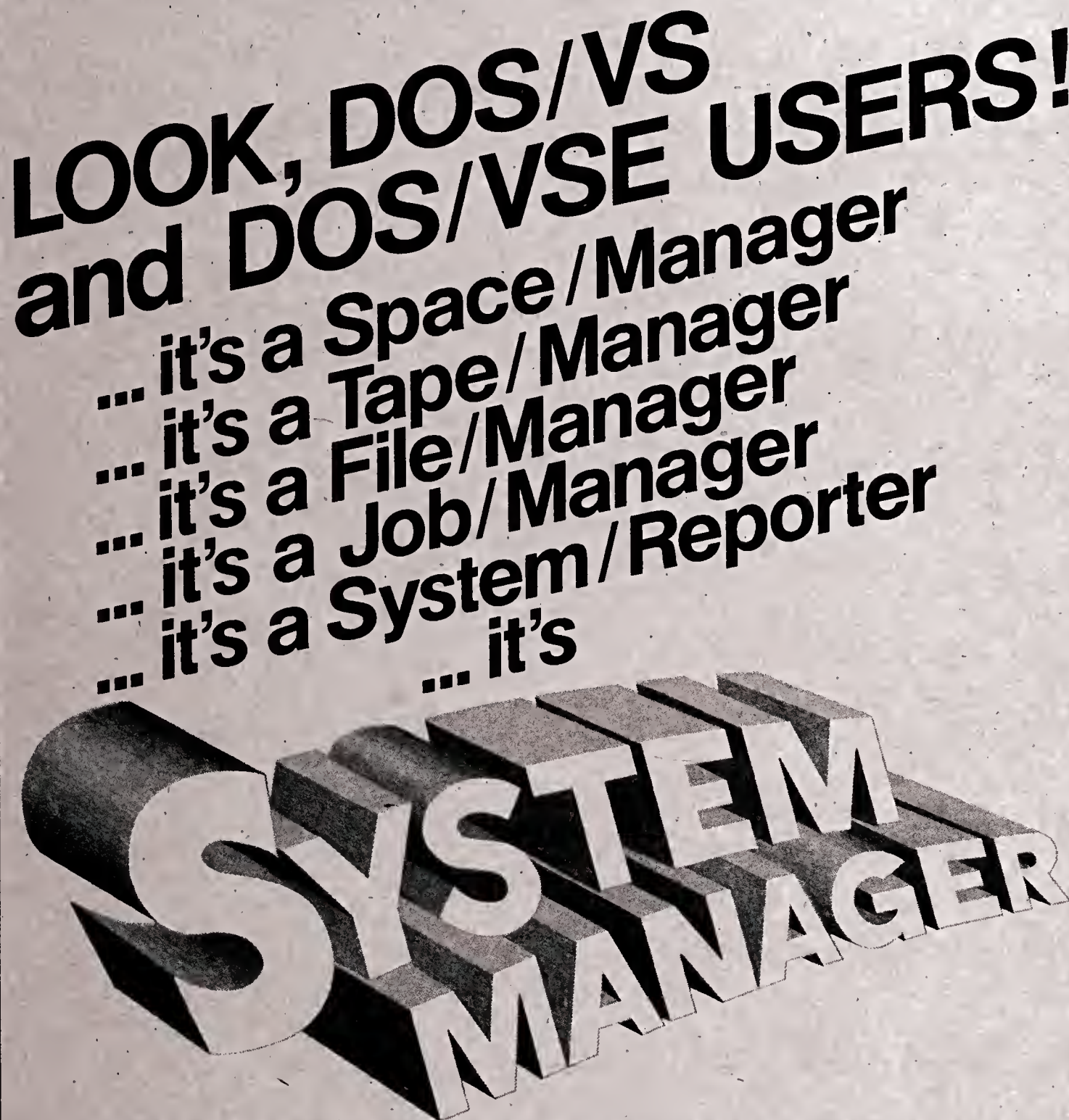
Smith said the debris from Skylab is equivalent to the yearly total of debris

from meteorites that actually hit the Earth. "If you go back and look at how many people have been injured by meteorites, six such cases have been reported in the past 200 years," according to Smith.

If you're still worried, there's a good chance it will all be over before you

even hear about it.

Smith said Nasa plans to keep a low profile during Skylab's final hours, the theory being that more people could be killed or injured in a panic spawned by reports that debris from Skylab will be falling than would be injured by Skylab itself.



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## IBM Wraps Up On West Coast

By Jeffrey Beeler

CW West Coast Bureau

SAN FRANCISCO — Poor management and faint-heartedness contributed far more to Transamerica Computer Co.'s downfall than any harmful actions by its competitors, IBM charged last week in the Transamerica vs. IBM antitrust trial.

Lead defense attorney William Vaughn made the accusations during his final argument, which came just one day before the seven-month trial ended and the jury of six men and four women retired to begin deciding its verdict.

In his final argument, Vaughn blasted Transamerica as an inefficiently run firm that lacked direction, lagged badly in technology and consistently shrank from competition. At the same time, he quoted several independent industry observers who gave IBM "excellent" ratings in practically all facets of its business, including management, service, hardware and technological innovation.

This dual tactic of alternately ripping his opponent and lauding his own client added another dimension to Vaughn's defense against Transamerica's charges that IBM monopolized the disk, tape and general-purpose CPU markets through predatory pricing and other anti-competitive acts.

Throughout his final argument, the IBM attorney's main defense tactic has been to counter Transamerica's arguments head-on, point by point. But by stressing the contrast between IBM's efficient management and Transamerica's allegedly inefficient operations, Vaughn apparently introduced a second line of defense against the plaintiff's charges.

In effect, he was telling the jurors, "Even if my client did exercise and abuse monopoly power — a claim we deny — there is no evidence that power was the cause of Transamerica's financial troubles. Transamerica's demise was its own doing."

# Memorex S.A. Files Against IBM

(Continued from Page 1)

"If Memorex and the other [plug-compatible manufacturers (PCM)] are unable to ascertain the interface specification, they cannot adapt their products for use with IBM systems. Without PCM products, there is no realistic alternative source of supply to which the IBM user could turn," the complaint said.

Over the years, the complaint alleges, IBM has changed the interface specifications without warning. It charges that IBM began holding back information on interface specifications from the PCMs which had previously been available.

"Being fully aware of the implications for competition, [IBM] nonetheless took deliberate steps, (i) to change and to eliminate interfaces without technological justification, and (ii) to conceal interface information. It took both actions with the intent of eliminating competition," the complaint charges.

"If IBM had been interested only in recovering the value of some trade secret innovation in an interface, IBM would have at least negotiated about the price of [an interface] license," Memorex contends.

"However," the complaint said, "IBM refused to grant an interface license at any price, indicating clearly that IBM intended to obtain the restraint on competition instead of just the value of some innovation."

### Treaty of Rome

These charges — while less sweeping than the ones in the EEC's overall investigation, which somewhat parallels the U.S. government's antitrust suit against the firm — seem to fit under Article 86 of the Treaty of Rome, which formed the Common Market. Taken together, Articles 85 and 86 of the treaty deal with fair competition.

Article 86 is concerned with firms in dominant positions in an industry. In the past, Common Market authorities have indicated that a dominant firm

would be one with a 51% share of the market. If a dominant firm does anything that might be construed as an attempt to restrict competition, it is deemed to be competing unfairly under the law.

While Article 86 singles out four particular types of possible abuses, the 20-some-page Memorex complaint seems to fall under Clause B, which prohibits a dominant firm from limiting production, markets or technical development to the prejudice of consumers.

Memorex asked the EEC in its complaint to order IBM to reveal interface information to competitors at the time a product is announced. It furthermore stated that "when IBM announces a product which interfaces with another product, IBM should be enjoined from enforcing any patents or copyrights which are part of the interface."

Memorex has not put forward any new evidence with the application, relying rather on evidence already presented in the Memorex vs. IBM case, in which the jury deadlocked 9-2 in favor of Memorex. The judge later gave IBM a directed verdict in the case; Memorex is appealing that verdict.

### EEC Investigation

While the Directorate General for Competition must act on the Memorex complaint, it is also working on its

own case against IBM. All of the 9,000 or so documents dealing with IBM's activities in Europe which were under a protective order during the Memorex vs. IBM trial have been delivered to the directorate during the past few months.

Under the mechanics of the EEC system, investigations are carried out privately; the directorate, which has extensive investigatory powers, has been looking at IBM records for five years now. There is no criminal taint to anti-competition cases here since all cases are civil.

By the same token, parties to an EEC investigation cannot claim privilege for documents, a legal procedure which has considerably slowed the U.S. vs. IBM case. The directorate can obtain a mandate, equivalent to a search warrant, and examine any part of a company's books.

Because of these wide-ranging powers — and the secrecy that usually surrounds such proceedings — companies generally cooperate with such investigations.

With the secrecy surrounding investigation of IBM, it is hard to tell how far the case has proceeded. However, several months ago, Willy Schlieder, head of the Directorate General for Competition, said the case would be launched in five months' time.

## AMS Finds Salaries Up 5% In '79 Company DP Survey

(Continued from Page 1)

of Texas.

By comparison, eastern U.S. firms pay programmers \$289/week; programmer/analysts, \$355; and systems analysts, \$401. This region includes the New England states, New York, Pennsylvania and New Jersey.

In the east central U.S., programmers earn \$294/week; programmer/analysts, \$337; and systems analysts, \$395. States in this area include Ohio, Michigan, Indiana, West Virginia and Illinois.

West central programmers make \$288/week; programmer analysts, \$344; and systems analysts, \$399. Falling into this region are Iowa, Minnesota, North Dakota, Nebraska, Wisconsin, Missouri and Kansas.

Average weekly salaries in the southern U.S. are generally lower than in other regions, according to survey results. Programmers draw \$282; programmer/analysts, \$346; and systems analysts, \$389 for an area including Georgia, Maryland, Alabama, the Carolinas, Tennessee, Florida, Kentucky, Arkansas, Oklahoma, Virginia and parts of Texas.

Compared with average weekly earnings in the 1978-1979 period, salaries rose almost across the board in each region. In the western region, for example, programmers were paid \$304 last year; programmer analysts, \$358; and systems analysts, \$387.

### Highest Payers

Turning to salary breakdowns by business sector, the survey showed U.S. manufacturing/processing firms paying the highest average salaries for these three DP positions both this year

and last — \$310/week for programmers, down from \$387 in 1978; \$368 for programmer/analysts, up from \$345 last year; and \$418 for systems analysts, up from last year's \$400.

The second highest paying business category this year is one that includes utilities, educational institutions, medical and employment companies. This group pays programmers an average of \$296/week; programmer/analysts, \$365; and systems analysts, \$405. Respective weekly salaries last year averaged \$283, \$343 and \$381.

No patterns emerged for the other categories, classified by AMS as banking/insurance/financial; retail/wholesale sales and distribution; and government agencies.

Average weekly salaries in the financial community are \$277 for programmers, up from \$253 last year; \$339 for programmer/analysts, an increase from \$322 in 1978; and \$385 for systems analysts, up from \$357.

Retail employers pay programmers an average weekly salary of \$295; programmer/analysts, \$336; and systems analysts, \$385. Comparable compensations last year were \$277, \$302 and \$359, respectively.

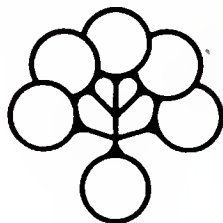
And in government agencies this year, programmers are earning \$291/week on the average, down from \$297 a year ago; programmer/analysts earn \$340, compared with last year's \$339; and systems analysts draw salaries averaging \$387, up from \$378.

The salary survey is part of the AMS "Office Salaries Directory," available for \$75 by writing to Directory 1979-1980, Administrative Management Society, Maryland Road, Willow Grove, Pa. 19090.

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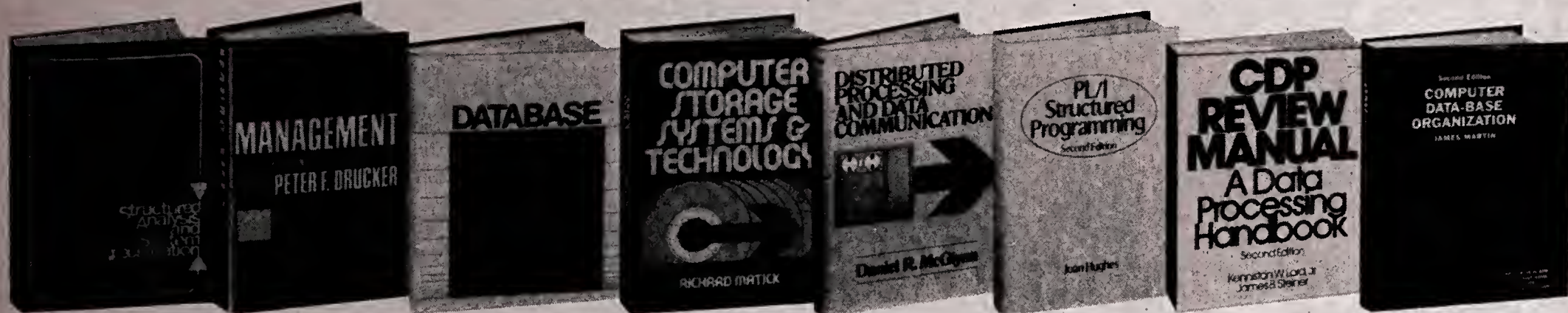
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## IRS Extends Deadline For Payroll Changes

WASHINGTON, D.C. — The Internal Revenue Service (IRS) has announced a six-month extension of the deadline for complying with its new Earned Income Credit (EIC) withholding and reporting requirements, and additional changes to the rule may be forthcoming.

The IRS regulation, originally scheduled to take effect July 1, calls for employers to make advance EIC payments to eligible low-income employees with every paycheck. The payment is presently made once annually by the federal government [CW, June 25].

Estimates of payroll reprogramming efforts involved for a medium-sized installation approach one man-month at an average cost of \$5,000.

The IRS said in its announcement that penalties would not be imposed for noncompliance by July 1 if a "good faith effort" toward compliance is made by the employer.

Congressional action in July could result in the exemption of certain employers of daily workers or the incorporation of the EIC into withholding tax tables, according to a House of Representatives staffer.

## With a Dozen Packages, User Values Independence

(Continued from Page 1)

than one second on the local units.

But Carolina Steel has also had Westinghouse's Disk Space Manager for two or three years, along with its Disk Utilities package and, quite recently, Westoc. Westoc lists the Volume Table of Contents (Vtoc) of the company's eight Intel Corp. 7330-I disk drives with a lot more flexibility than was possible with IBM's utility, Parrish said.

The Disk Space Manager eases preparation of JCL, handles allocation of free space and manages Isam files beautifully, he added. The Disk Util-

ities package "is just one of those things we couldn't live without."

### Warmest Praise

But Parrish saved his warmest words for Goal Systems Corp.'s Flee-Flim, a high-speed replacement for IBM's linkage editor and library controller. This gives him the "most leverage" over his system, he said, adding that by eliminating the normal DOS condenses it has paid for itself over and over again in the three years he's had it.

The Speed package from Macro 4, Inc. also rates high on Parrish's list, even though it's a recent acquisition. This software simulates full track blocking and eliminates contention problems on the DASD units that are now shared by the two CPUs.

Commenting on the interplay of vendors that becomes more and more inevitable in multipackage shops, Parrish noted that Speed had had a conflict with the Quikjob report writer from System Support Software, Inc. (SSS). Macro 4 knew about the problem, but SSS wasn't aware of it at first. However, once the Quikjob people recognized how to solve the problem, they fixed their package, he said.

Carolina Steel had been using Boost from Macro 4 when it had only one 370/135, but there is no need for it now that it has two CPUs and priority jobs are not such a troublesome problem, the manager said.

Returning to his use of Quikjob, Parrish said that package obviously was one that supported programmers directly rather than the data center. In use six years, it was intended primarily for one-time jobs — the classic "quick and dirty" things management has to have — but many of the reports, still coded in Quikjob, have moved into Carolina Steel's regular production cycle.

### Cobol Jobs in Place

The company once spent some time rewriting some of the jobs in Cobol, but many are still in place and doing fine, he said. Parrish had looked at other similar packages — Dylakor Software Systems, Inc.'s DYL-250 and Pansophic Systems, Inc.'s Easytrieve, for example — but chose Quikjob because he liked the logic of the system.

Carolina Steel is also a user of packages from Computer Associates, Inc. These include the CA-Dynam/T tape library management system and CA-Sort, the replacement for IBM's sorts that Computer Associates brought over from Europe several years ago and has enhanced significantly since then.

Parrish's second 370/135 was brought in early this year. Even with the support provided by the software packages, he and Rice see the 370 environment as only a fairly short-term answer to the company's needs. An IBM 4341 is on order, and the managers are hoping for an early delivery date.

They can't be sure until they know more about the new equipment and its DOS/VSE operating system which, if any, of the packages will still fit into their plans. But they certainly seemed pleased just in talking about what they had accomplished in the past and are still doing today.

## 'Automath' Translates English to Fortran

(Continued from Page 1)

the user can have Automath generate the code necessary to run any of a wide range of computations in Fortran. This code tends to be self-documenting, inline functional and "top-down" in appearance, according to the spokesman.

And, most important, the generation is completed in seconds, whereas a highly skilled (and highly paid) programmer might require days to produce equivalent code, he pointed out.

Odyssey cited the following capabilities for Automath:

- Expansion and ordering of polynomials and rational functions.
- Symbolic differentiation and inte-

gration.

- Substitution and pattern matching in a "wide variety" of forms.
- Calculation of the greatest common divisor of two polynomials.
- Automatic and user-controlled simplification of expressions.
- Calculations with symbolic matrices.

Further, the utility package reportedly offers a Lisp-like language for symbolic calculations. This language was used to write Automath and can be applied to esoteric problems in resolution logic, the spokesman noted.

The package's most prominent feature seems to be what Odyssey termed "general algebraic solving for solutions

to single and multiple equations which contain solutions expressible in finite terms." In plain English, this would make the application of certain sophisticated models feasible for the first time.

How does Automath work? Reluctant to divulge proprietary methods, Odyssey simply declared that Automath's "principles of operation are based on a system which understands the rules of mathematics and systems engineering."

More specifically, a way was found to allocate the resources of IBM mainframes in a manner far more efficient for the purposes of complicated number crunching. Automath developer and Odyssey president Jules Gilbert told *Computerworld* that some algorithms "in the public domain" — published in academic journals — were applied in the development.

But the essence of Gilbert's accomplishment seems to be a novel application of artificial intelligence techniques, developed to endow machines with cognitive capabilities.

Automath also includes some more conventional features, such as a plotting and graphics interface to aid the representation of mathematical functions. The utility even provides a "pre-computed" list of the first million prime numbers.

Though Automath will operate in batch mode, an IBM Time Sharing Option (TSO) or Conversational Monitoring System (CMS) environment is recommended for "best user productivity." At present, the utility requires an IBM OS "machine type" but, after refinements are made, Gilbert hopes to win Digital Equipment Corp., Control Data Corp. and Burroughs Corp. users as customers.

Typical Automath users will need 200K bytes of main memory, but an organization of 35 Automath users should absorb the computing power of an IBM 370/158 with 2M bytes of main storage, Gilbert said.

Odyssey is offering free demonstrations and user trials of Automath to interested DP groups. The package costs \$25,000 plus "a small license fee" to cover maintenance.

However, the software house pledged a price discount in excess of 50% to purchasers that join an Automath users group. Members should be able to perform their own Automath maintenance, Gilbert said.

Odyssey Systems can be reached at Box 33, Watertown, Mass. 02172.

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# Europeans Speeding Work on Data Protection

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — The Council of Europe (COE) has accelerated deliberations on proposals to ensure personal privacy protection in the international movement of automated data.

According to U.S. officials here, the COE is trying to parallel the almost-completed work on transborder data flow guidelines done by the Organization for Economic Cooperation and Development (OECD).

At a recent meeting in Strasbourg, France, a COE "experts group" accepted a draft convention on transborder data flow which essentially reflects the U.S. point of view that international data protection measures should be primarily a voluntary matter and the free flow of information should not be unnecessarily impeded.

As described by a U.S. observer to the COE meeting, the draft convention is very similar to voluntary guidelines approved by an equivalent OECD panel at a meeting in Stockholm during the first week of June. The OECD document [CW, Jan. 15] is expected to be approved by the OECD Council of Ministers early next year.

The COE convention, which accepts "the position of the free-flow people," should be ready for ratification by its member countries by the end of 1980, according to Morris H. Crawford, director of the State Department Science Office.

## Stimulus of OECD

Because the convention will have the force of law in the countries where it is ratified — as opposed to the strictly voluntary OECD guidelines — it had been thought that the COE deliberations would take considerably longer than those of the OECD.

"I suppose the very effective work in the OECD has been a stimulus [to the COE]," Crawford told a recent meeting here of the State Department's Public Advisory Subcommittee on Transborder Data Flows. The council "has been moving at breakneck pace" to catch up with the OECD, he said.

As explained by Crawford, under the COE convention, "governments will do their utmost to ensure when data comes into their jurisdictions to get [privacy] protections that are satisfactory to the laws of the [country] from which the data came.

"It's a very permissive clause," he said, noting that there is no statutory restraint on data movement. Signatories to the agreement will not be obliged to adhere to the letter of the law of the nation in which the data originated.

The U.S., not a member of the COE, presently has no plans to become a signatory to the convention, according to Crawford. Similarly, there is no intention to adopt the OECD guidelines into U.S. law, although privacy legislation being readied by the Carter Administration reportedly will embrace the philosophy of the guidelines.

Crawford said the proposed COE treaty does not show any bias against nonsignatories, a possibility that had been a concern to U.S. officials. "I think that the governments that have been seeking to avoid any wall of any kind around the signatories have been successful," Crawford said.

"I don't find any great differences in-

sofar as the transborder data flow question is concerned between the Council of Europe draft and the OECD guidelines."

## EEC Action

In addition, Crawford predicted that the European Economic Community (EEC), which has also shown an interest in privacy and transborder data flows, is not going to take any action contrary to that of the COE and OECD. He noted that EEC representatives have attended meetings of the drafting groups of those two organizations.

"I don't foresee the European Community taking independent action apart from its governments in this issue of data protection. They [EEC] are

quite interested in some of the peripheral matters that are related to data protection, such as computer security, but primarily on a technical basis.

"[The EEC] is also interested in questions of other aspects of computer operations — the encryption standards, for example." Similarly, Crawford said, the U.S. should now move on to "focus on much more important issues than the data protection, that is, some of the applications of computer technology and the international aspects of those.

"One of the useful things we might do is to propose that OECD begin to investigate the advances in computer applications in corporate information systems. This is something OECD has done a great deal of work on in the

past but something that has been dropped by the wayside as the interest was more pronounced in these data protection issues.

## Back to Basics

"I think the OECD ought to return to this other subject of inquiry which is much closer to OECD's basic concern anyway, which is national production and economic performance of the Western nations," Crawford noted.

Crawford said this is a subject that will be brought up during the next meeting of the Public Advisory Subcommittee, scheduled for Sept. 25.

The subcommittee will also continue a discussion, begun at its last meeting, of how the U.S. will implement the OECD guidelines.

(Advertisement)

## To COBOL programmers who want to enjoy their work more

Should you enjoy your work? I think so. And programming has the potential to let you enjoy it. It can be challenging, exciting, at times just plain fun. But all too often, it's anything but enjoyable.

Perhaps you've been there. You're already a month behind schedule. You've taken six test runs trying to find the cause of just one bug and you're no closer to a solution. Your flowchart documentation hasn't been brought up-to-date so it no longer represents your coding. And now there's a specification change, just a minor user change but one that plays havoc with your program logic.

No, programming under those conditions isn't fun. It's disturbing, discouraging, sometimes frustrating to the point of tears. But it doesn't have to be that way.

### A better way to program

Quite frankly, I don't think anyone can remove all of the frustrations of programming. No matter how well your shop is run, there are going to be system problems that confound your test runs for days at a time. There are going to be schedules, often unreasonable ones. And there are going to be late specification changes. You can't change these conditions, but you can change the way they affect your work.

Our solution is a better system of program development. By properly designing your programs, even major changes in program specifications will have only minor effects on your programs. By adopting more effective methods of program documentation (the flowchart is dead), you will have less trouble with program maintenance. By using better methods of design, coding, and testing, you will have fewer bugs when you start testing and they will be easier to find and correct. And by having better control over all phases of program development, from design to testing, you will have less chance of getting behind schedule.

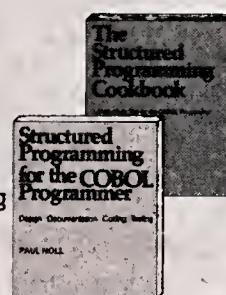
If you're interested in a better system of program development, I'd like to recommend a couple of books by Paul

Noll, a software specialist and training manager. Paul is one of the top COBOL experts in the country, and he has some unique ideas about program development. After experimenting for several years with the latest programming techniques—the ones associated with structured programming—Paul decided that no one had developed a practical way to implement them. So he developed his own methods. His methods are now presented in two books written specifically for the experienced COBOL programmer.

### What the books do

The first book, *Structured Programming for the COBOL Programmer*, presents a complete system for developing COBOL programs. It includes top-down design, structured module documentation, structured coding, and top-down testing. To use Paul's methods, you won't have to learn a new vocabulary and you won't be overwhelmed by theory. On the contrary, I think you'll be delighted by the straightforward simplicity of Paul's methods.

The second book, *The Structured Programming Cookbook*, is a reference manual for the development of new programs. It gives standards and guidelines for all phases of structured program development. And it gives complete design, documentation, and coding for four programs that represent the four major classes of business problems. These programs are intended to cut down the repetition in your programming efforts.



When you develop an update program, for example, I think you'll find that you can use the structure chart, some module documentation, and even some of the COBOL code from the model update program in the cookbook. This frees you from the tedious aspects of program development and lets you concentrate on the more challenging aspects.

If you are already developing structured programs, I'm convinced that Paul's books can help you to improve your methods so you'll enjoy your work more. And if you haven't yet been introduced to structured programming, you've got some exciting reading ahead of you. I think Paul can show you how to minimize the frustrations of programming while you maximize its challenges.

### What other programmers think

Here are some excerpts from letters we've received from programmers throughout the country:

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S-10

## Technical Savvy No Longer Enough

# Good DP Manager Means Good DP Shop . . .

By Tom Henkel

CW Staff

ST. PETERSBURG, Fla. —

One of the best ways to ensure that the DP department is working up to par is to hire a good manager, but that may be easier said than done, according to William C. Cross.

Cross, who is director of information services for the ECI Division of E-Systems Inc., said in a recent interview that the lack of professional man-

agement in many DP departments is a major factor in spiraling costs.

However, it won't be long until more than 90% of the company's DP budget will go for personnel; that will cause top management to take a harder look at the operation to be sure it's getting its money's worth, he noted.

"If you take an overall view of DP managers, there are a lot of good ones, and there are a

lot that aren't quite so good. A lot of us haven't had the benefit of management experience. We've been made manager because we were the best programmer, so we've got a lot of catching up to do.

"The DP industry is moving in a direction where the manager is going to be more of a manager and less of a technician. But in that kind of situation, you're going to have to have some sort of senior technical people on your staff," Cross said.

### Manager's Watchdogs

E-Systems uses two "consulting analysts," — senior technicians on the DP staff — to act as watchdogs for the DP manager.

"They have the latitude to go anywhere in the organization to uncover and solve problems. Their goal is to remove and point out technical and performance problems. They know exactly what kinds of performance should be expected from both equipment and people," Cross explained.

For the system to work, the DP manager must have enough technical experience to understand what the watchdogs are telling him. And he must have the management skills to be able to deal with the top company brass.

"The manager of the future is going to be picked more for his managerial skills than his technical skills. I'm not deriding either, but we've got a whole lot of technicians around.

"If you look at the folks being picked as directors and vice-presidents in [management information systems], they are people with qualifications other than the fact they are a good programmer or have been in data processing for 10 to 15 years.

### Do Something

"The DP manager planning for the future should strengthen himself in management techniques. An ideal way is an MBA or something similar. Go to seminars. Take some night courses or correspondence courses in management," Cross suggested.

"As the DP manager becomes more of a businessperson and less of a technician — at least in management's eye — he communicates more on their terms. Management could care less about how many bytes of memory get used. Management cares how much it costs.

"If [management] asks you how much it's going to take to do a job and you say \$50,000, it understands that. If you say it will take five programmers a couple of months and so much computer time, it can't relate

to that," Cross pointed out.

One way DP managers can improve their departments is to be aware of the people in it. A programmer who consistently produces high-quality code quickly — a person Cross calls a "superprogrammer" — should be tapped for his complete potential.

### Use or Lose Him

"If you're fortunate to have somebody like that on your staff, make use of him. Don't make him a coder on a minor maintenance person or he'll go away.

"Once identified and put in a position of responsibility, [superprogrammer] will do one heck of a job."

How can superprogrammers be discovered? "Observation of their performance is the only real way you can identify them. It will be obvious.

Somehow their things get completed faster, and they always seem to work.

"Most programmers are creative, fiercely independent individuals who can't be snapped to attention by military-style commands. However, they can be led effectively by people who understand the psychology of creative professionals and take the time and trouble to learn and follow classic management steps and procedures," Cross said.

According to Cross, three danger signals indicate management failure:

- High, unplanned turnover.
- Lack of communication.
- A decline in department productivity.

"That's why the technological background is still necessary. I think what we've done in the past is give it too much importance," Cross said.

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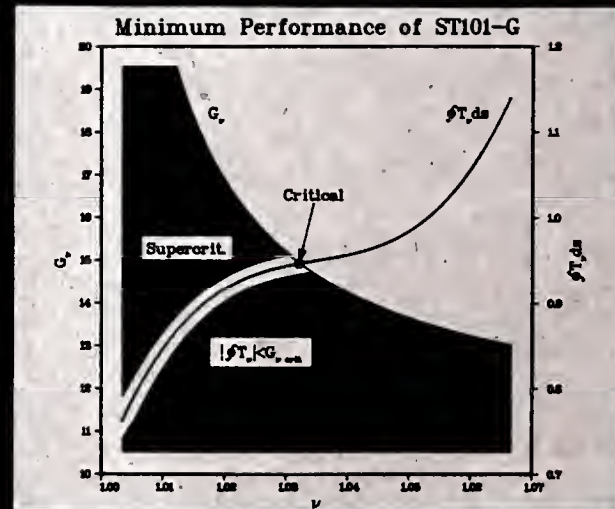


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## Start With Problem-Solving Atmosphere

# ... According to a Person With Some Advice

By Tom Henkel

CW Staff

ST. PETERSBURG, Fla. — Looking to improve your DP department? Here is the method William C. Cross, information services director for the ECI Division of E-Systems, Inc., used to beef up his department:

- Ask programmers to anonymously submit written questions and problems. Then distribute copies of the questions and answers at a staff meeting for general discussion.

"It was very effective," Cross said. "The exercise created a cooperative, problem-solving atmosphere, and I quickly learned about problems that might have escaped my attention for months.

"When managers see communications breaking down, they often try to turn over a new leaf by asking individuals to air grievances at staff meetings. This approach is seldom successful because individuals are generally shy and feel awkward voicing complaints in a group."

- Delegate responsibility to programmers who are willing to plan and account for their efforts. Help superprogrammers — programmers with exceptional ability — do the job expected of them by removing the petty obstacles in their paths.

- Allow programmers to set up their own hours. "I ask programmers to be here for the time they are paid and to work the majority of their hours in the normal workday. If an individual stays here all night trying to solve a problem and doesn't come to work again until the next afternoon, there's no problem.

"However, if programmers are going to work a strange schedule for an extended period, I ask them to let us know so we can intelligently answer questions about their availability."

"Our programmers have responded to this flexibility by working far more hours than they would with a dictated schedule," Cross said.

- Give beginning programmers a feeling of achievement, coupled with quick advancement to ensure job satisfaction. "Helping superprogrammers feel they are growing professionally is difficult," Cross said. "These individuals are already at the pinnacle of their profession. However, their need for professional self-fulfillment is no less."

Rewards, such as seminars and training schools, provide incentives for improved performance. Management also benefits because programmers become better qualified and more versatile, Cross observed.

- Get programmers to document

their own programs. One way to make documentation the programmers' job is to ask them to write down what the programs will do before they actually create the code. After coding is completed, programmers want to go on to something else; documentation then becomes more of a chore.

- If a system is being modified, have the programmers add a narrative note describing the changes being made. ECI maintains a program library that prints out programmers' remarks and specification worksheets as permanent documentation. Flowcharts were replaced by operator-run instructions that combine system flow, setup and restart/recovery procedures in an

easy-to-read form.

- Distribute the workload fairly and make maintenance assignments part of each programmer's schedule. "Since any programmer would rather create something new than re-create something old, we set development timetables so programmers working on new systems still retain 20% to 25% of their time for short-term maintenance programs," Cross said.

"Programmers may not like maintenance any more now, but they accept it as a routine part of their jobs," he added.

It took about two years to implement the ECI program, and the company is

still working on it. "I look at DP operations, a systems and programming shop and a consulting management kind of shop. All three functions report to the director," Cross explained.

Asked if the ideal system would prove too costly for the average shop, Cross said, "I don't think so. In most shops you have a director of some sort. You take your senior technical people, who you would probably have on your systems and programming staff anyway. Put them — rather than under the systems and programming guy — directly under the department manager. This gives them the latitude to cross each of those sections without criticizing the guy they work for."



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## Potential Danger Increasing?

# Centers Understaffed, Air Controllers Charge

By Marguerite Zientara  
CW Staff

LEESBURG, Va. — A shortage of computer technicians on duty at major airport and air route traffic control center (ARTCC) DP installations is giving rise to potentially dangerous situations around the country, according to aviation industry spokesmen.

The danger reportedly lies in the possibility that air traffic controllers might lose the computer-generated alphanumeric data displayed on their radarscreens at a time of heavy air traffic. The data indicates an aircraft's flight number, altitude and ground speed.

Controllers contend that while they can effectively control air traffic without that data, the possibility of a mid-air collision increases in the first few minutes after the data disappears, when the control-

ler could become disoriented and lose track of his airplanes [CW, June 18].

While the usual complement of DP service people on duty includes one supervisor, three system specialists and one subjourneyman technician, in some recorded instances a single technician — in some cases a trainee — has handled "the whole ball of wax" for full eight-hour shifts, according to John B. Galipault, president of The Aviation Safety Institute in Worthington, Ohio.

One such instance occurred at the Washington, D.C., ARTCC here recently when one technician was in charge of the maintenance and repair of two triplex computer systems, each located on a different floor, according to Louis Traini, the relief technician on duty at the time.

The ARTCC houses an IBM 9020D on one floor and an IBM 9020E on another floor.

### Single Technician Sufficient?

On Sunday, April 29, from 8 a.m. to 4 p.m. and again on Friday, May 4, from midnight to 8 a.m., a single technician oversaw the entire installation, he said — a situation that prompted Traini to file an "Unsatisfactory Condition Report" with the Federal Aviation Administration (FAA).

In reply, the FAA stated, "The system engineer [on duty at the time] felt that the benefit derived by holding an additional technician on overtime did not justify the monies required to pay the overtime."

The FAA's reply also contended that the shifts in question were during periods of low traffic, but Traini disagreed. "That's not true on the

midnight shift," he said, "because between 6 a.m. and 8 a.m. is the peak traffic time, and that man was still on duty by himself."

The FAA further replied that "the systems engineer also felt that the equipment reliability was such that both systems having a problem at the same time was unlikely."

Although Traini conceded that the IBM equipment is very reliable as a result of the center's "pretty thorough" preventative maintenance program, he said, "If this system engineer has a crystal ball that can foresee one second into the future — let alone eight hours — I think the world's waiting for him."

Outages have been recorded on the system despite its high reliability, Traini said, and the real problem is the possibility of problems hitting both systems simultaneously. "If you have one man, how could he possibly cover both systems at once?"

"This situation of understaffing presents a serious hazard to air safety," Traini wrote in his formal complaint.

### 'We're Adequately Staffed'

FAA officials, however, view the situation differently. "We're adequately staffed, and certainly we would not allow a situation to develop where our technical support doesn't meet the requirements of the air traffic system," stated Mel Watine, acting chief of the

FAA's Eastern Regional Airways Facilities Division.

While Watine conceded the FAA has a program specifying the number of dollars allocable for overtime pay, "that is not the factor limiting the provision of the necessary coverage." And when asked if he felt an instance like the one in Leesburg constituted a "dangerous" situation, Watine replied, "I wouldn't use the word 'dangerous' — that's such a dramatic word."

"When you have equipment designed for highly reliable service, that determines the technical support requirements," he continued. "If you don't have the workload to justify two or four technicians on duty, there's no point in having four people work just to give you the comfort in case three other people get sick."

As for the possibility that the two systems at Leesburg could have failed simultaneously, Watine said, "The law of probability enters here; when you've got a multiple capability location, certainly the possibility of having a catastrophic outage is very remote."

While the FAA appears to be ignoring the apparent danger of the situation, the Professional Airways Systems Specialists (Pass), a 16,000-member labor organization, is "very definitely concerned about the problem," according to its president, Howard E. Johannsen.

## Critics See FAA Plan Overloading DP More

By Marguerite Zientara  
CW Staff

WASHINGTON, D.C. — While major airports around the country have repeatedly experienced outages of air traffic control computers in recent years because of memory saturation and a dearth of computer backup systems, proposals have been made here that would increase those DP loads even more.

Federal Aviation Administrator Langhorne Bond late last year proposed lowering the floor of positive control airspace (PCA) from 18,000 feet to 10,000 feet east of the Mississippi River and in parts of California and to 12,500 feet over the Rocky Mountains [CW, April 23].

While the proposal is intended to make air traffic control protection available to 97% of scheduled air carrier passengers, it has drawn strong opposition from air traffic controllers and aviation industry watchdogs. Opponents of the plan question the

ability of current installed air traffic control computer equipment to handle additional traffic data.

### Close to Capacity

In Florida, FAA officials are examining a plan to consolidate enroute and airport traffic control facilities from Jacksonville to Miami using the existing IBM 9020A computer system supplemented by an air route traffic surveillance (Arts) computer system.

In a November 1978 memorandum to FAA headquarters, the chief of the southern region's Air Traffic Division stated that "the main problem to be solved is the limited capacity of the Miami ARTCC 9020A system, already operating near full capacity."

The memorandum noted that, although "there are a number of needed services which are not being provided ... the Miami 9020A computer [reached] 98% of capacity on Jan. 3, 1978, causing a system failure."

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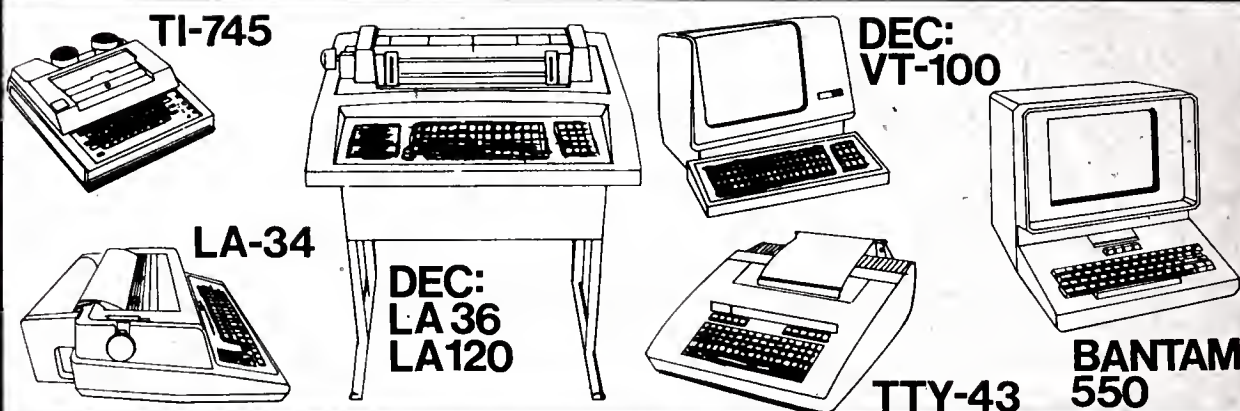
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# Take Note of Data Flow Laws, Auditors Warned

By Tim Scannell

CW Staff

DENVER — Mention "transborder data flow" or "the multinational exchange of computerized information" and most American-based companies will probably give little more than a friendly, but unofficial, nod of recognition.

However, the regulatory tides are changing and so are these casual corporate attitudes.

Legislative activities in foreign countries, particularly Europe, concerning the passage of data from one part of the world to another is forcing otherwise disinterested firms to sit up and take careful notice, according to Eric J. Novotny, a computer security and privacy consultant with Computer Resource Controls Inc.,

Addressing what seemed to be a multinational audience of DP auditors at the EDP Auditors Association's Seventh International Conference here recently, Novotny pointed to some of the key issues surrounding transborder data flows — especially from an auditor's perspective.

"A lot of people think transborder data flow is a fad that will eventually well up and go away," the transcontinental communications expert noted. But current technological pressures, including hardware and software developments, will only drive the issue more into the limelight.

## Areas of Concern

Warning that future laws on international informational exchange could be more detrimental than helpful, Novotny outlined some major areas to consider when dealing with foreign regulations. First of all, because companies are interacting with different people and different cultures, privacy protection and fair information practices can vary. While some countries may restrict access to a person's or a company's computerized files, other nations might allow unrestricted access to a data bank.

Secondly, although regulatory agencies previously concerned themselves with handing out license and establishing protocols for general computer communications, their roles has changed. Computer information is

now being investigated, regulated and restricted according to its content and not what type of communications line is used, Novotny explained.

From the auditor's point of view, changes in the basic ways DP is going to be done rather than who's sending what information where will be a more important consideration, he observed. Since DP centers will become more isolated when straight jacketed by regulations, the auditor will have to deal "with large numbers of conflicting and often contradicting laws . . . that carry criminal penalties."

Also, if countries insist on having the computer information reside in the land where it was produced, auditors will have to travel to those countries to access needed data. Given the recent

situation in Iran, this would be impossible since any computer records would probably be impounded or destroyed, leaving a distant company with little chance for data recovery.

## Laws Already Enacted

Unlike the U.S., a number of countries are already preparing for the inevitable onslaught of transborder data exchanges, Novotny noted. France, for instance, recently issued a report stating that the French government should increase the amount of in-country data bases available to it.

This conclusion was reached when an investigative committee discovered, among other things, that a Cambridge, Mass.-based company had more economic information on France than the

government did, Novotny said.

Third World countries are another consideration because they will demand an increasing share of worldwide information resources as an aid to socioeconomic development, Novotny added. This could threaten the security of corporate data bases and trade secrets that are filed outside a company's base country.

Finally, current multinational data transfer laws are not only aggressive, but often dictatorial in nature, the consultant said. In Sweden, the Data Inspection Board continually reviews all applications for communications licenses and is prepared to take away a company's license if it doesn't pass strict security procedures.

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July 23-24, New York — **Time Management.** Contact: American Management Associations, 135 W. 50 St., New York, N.Y. 10020.

July 23-25, Valley Forge, Pa. — **Implementing Cryptography in Data Processing and Communications Systems.** Contact: Ketron, Inc., 530 E. Swedesford Road, Wayne, Pa. 19087.

July 23-Aug. 3, Santa Cruz, Calif. — **Compiler Construction.** Contact: Joleen Kelsey, University of California Extension, Santa Cruz, Calif. 95064.

July 30-Aug. 3, Santa Cruz, Calif. — **Computer System Performance Prediction for System Tuning and Configuration Planning.** Contact: Joleen Kelsey, University of California Extension, Santa Cruz, Calif. 95064.

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July 30-Aug. 3, Singapore — **Computers/Peripheral Equipment Trade Show.** Contact: Office of International Marketing, Room 4012, Bureau of Export Development, U.S. Department of Commerce, Washington, D.C. 20230.

Aug. 1-2, Waltham, Mass. — **Maintenance Planning, Scheduling and Control Systems.** Contact: Bentley College, Center for Continuing Education, Beaver & Forest Streets, Waltham, Mass. 02154.

Aug. 1-3, Washington, D.C. — **Creating an Office of the Future Now.** Contact: Management Resources International, Inc., 6621 Electronic Drive, Springfield, VA 22151. Also being held Aug. 27-29 in San Francisco.

Aug. 2-3, Boston — **The Third Annual DP Trainer's Conference.** Contact: Ware Associates, 38 Main St., Hudson, Mass. 01749.

Aug. 2-3, Worcester, Mass. — **Cobol Programming Workshop.** Contact: The Foundation for Continuing Education, 15 School St., Boston, Mass. 02108. Also being held Aug. 23-24 in Providence, R.I.

Aug. 6-8, Saint Louis — **Seventh Conference on Electronic Computation,** sponsored by the American Society of Civil Engineers, Structural Division, Committee on Electronic Computation. Contact: Prof. C. Wayne Martin, 212 Bancroft Hall, University of Nebraska, Lincoln, Neb. 68588.

Aug. 6-8, Chicago — **Pattern Recognition and Image Processing.** Contact:

Pattern Recognition, P.O. Box 639, Silver Spring, MD 20901.

Aug. 6-10, Chicago — **Siggraph '79 Exposition,** sponsored by the Association for Computer Machinery. Contact: Tom Defanti or Bruce H. McCormick, Siggraph '79, Department of Information Engineering, University of Illinois at Chicago Circle, Box 4348, Chicago, Ill. 60680.

Aug. 12-15, St. Petersburg Beach, Fla. — **The 11th Annual Meeting of the National Association for State Information Systems (Nasis).** Contact: Nasis, P.O. Box 11910, Lexington, KY 40578.

Aug. 13-14, San Francisco — **Time Management.** Contact: American Management Associations, 135 W. 50 St., New York, N.Y. 10020. Also being held Aug. 30-31 in Chicago.

Aug. 13-15 Boulder, Colo. — **Conference on Simulation, Measurement and Modeling of Computer Systems.** Contact: Paul Roth, General Chairman, U.S. Department of Commerce, National Bureau of Standards, Washington, D.C. 20234.

Aug. 13-17, Rosemont, Ill. — **Seminars in IBM Facilities for Auditors and Accountants and Cobol Programming.** Contact: Michael I. Sobol, MIS Associates, 63 Gelica Drive, Framingham, Mass. 01701.

August 13-15, New York — **Introduction to Distributed Data Processing for User Management.** Contact: American Management Associations, 135 W. 50 St., New York, N.Y. 10020.

Aug. 19-22, Pingree Park, Colo. — **Third Rocky Mountain Symposium on Microcomputers.** Contact: Michael Tindall, Department of Computer Science, Colorado State University, Fort Collins, Colo. 80523.

Aug. 20-21, Los Angeles — **Word Processing for Managers.** Contact: Management Resources International, Inc., 6621 Electronic Drive, VA 22151. Also being held Aug. 23-24.

Aug. 20-21, Chicago — **Seventh Annual Speakeasy Conference.** Contact: Speakeasy Computing Corp., 222 W. Adams Street, Chicago, Ill. 60606.

Aug. 20-22, Seattle — **Project/Program Management Workshop,** sponsored by Planning & Control Corp. Contact: Project Management Workshop, 331 Madison Ave., New York, N.Y. 10017.

Aug. 20-22, Houston — **Fundamentals of Finance and Accounting for Nonfinancial Executives.** Contact: American Management Associations, 135 W. 50 St., New York, N.Y. 10020.

Aug. 20-22, Hanover, N.H. — **The Fourth International Conference on Computers and the Humanities,** sponsored by Dartmouth College. Contact: Joseph Raben, Queens College City University of New York, Flushing, N.Y. 11367.

Aug. 20-23, Toronto — **The 26th International Operational Data Security Workshop.** Contact: Robert J. Wilk, Operational Data Security Corp, 6 Swarthmore Lane, Dix Hills, N.Y. 11746.

Aug. 20-24, Troy, N.Y. — **Introduction to Computer Graphics.** Contact: Richard J. Teich, Office of Continuing Studies, Rensselaer Polytechnic Institute, Troy, N.Y. 12181.

Aug. 20-24, Tokyo — **Sixth International Joint Conference on Artificial Intelligence (IJCAI-79).** Contact: Prof. Bruce Buchanan, Computer Science Department, Stanford University, Calif. 94305.

## Calendar

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# Third State This Year

## Michigan Legislature Passes DP Crime Bill

DETROIT — A bill to prohibit the fraudulent use of a computer has cleared the Michigan Legislature and was sent to the governor for his signature.

H.B. 4112 swept through the state House of Representatives on May 23 by a vote of 101-0. The bill passed the state Senate 34-0 on June 25.

### Gov. William Milliken is expected to

## Federal Agencies Gain Access To NIH Facilities

WASHINGTON, D.C. — A federal data processing center that will make use of the National Institutes of Health (NIH) computer center has been created, the Department of Health, Education and Welfare (HEW) announced recently.

The NIH computer facilities will be available to federal agencies requiring biomedical and statistical computational support. The government already operates several other DP centers designed to allow interagency sharing of computing resources.

In a May 31 signing ceremony inaugurating the new facility, Frank Carr, head of the General Services Administration's Automated Data and Telecommunications Service, said establishment of the center "supports a recommendation by the President's Federal Data Processing Reorganization Project to establish specialized assistance centers to meet the needs of multiple federal agencies" [CW, June 4].

According to HEW Deputy Assistant Secretary L. David Taylor, "use of the facilities by several federal agencies economizes on computer costs, improves productivity and reduces the need for more facilities. This enables even small and new agencies to have access to a wide range of tested, specialized computing techniques without the expense and delay of developing them anew."



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sign the bill, which would take effect 90 days later.

Michigan is the fifth state to pass a computer crime law and the third state to do so this year (CW, May 21; June 4). Like those of Colorado and Rhode Island, the Michigan statute prohibits "access to computers, computer systems and computer networks for certain fraudulent purposes."

It also prohibits "intentional and unauthorized access, alteration, damage and destruction of computers, computer systems, computer networks, computer software programs and data."

The new law explains those and other terms in a string of eight defini-

tions from "access" to "service."

The law includes both misdemeanor and felony penalties. Violation under \$100 constitutes a misdemeanor; violation of more than \$100 is a felony, punishable by imprisonment up to 10 years, a fine of \$5,000 or both.

Two events spurred passage of the bill, according to its sponsor, Rep. Michael Bennane (D-Detroit).

"First, we became involved in the privacy issue and began to realize the problem of illegal access to computers and the information stored in them," Bennane said.

"Further, we learned that the California Supreme Court had turned down a case because no computer crime law

existed in that state and because of the [intangibility] of a theft of information. We wanted to avoid a similar situation in this state."

The bill, which was modeled after legislation pending in California, had the full support of the computer industry and the banking community, Bennane said. Banks are particularly reluctant to report a computer crime for fear that the public will feel they are "unstable," he added.

The Michigan law aims to deter a person who considers using a computer for illegal purposes. For those who take the risk and are caught, the law should make prosecution and conviction easier.

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## U. of Michigan Data Base Stores Poll Information

By Tim Scannell  
CW Staff

NEW YORK — Although computer-based data banks are frequently regarded as potentially dangerous stockpiles of information, these "black clouds" do have some silver linings.

The University of Michigan's Intrauniversity Consortium for Political and Social Research (ICPSR) is an active data gathering, processing and dispensing system. But it provides far more social and personal benefits than it could ever threaten to take away, according to Dr. Gregory A. Marks of the University of Michigan.

The system — which has more than 200 subscribers — serves both political and academic research needs, according to Marks. Basically, the data base is an archive of current survey information containing everything from census and educational statistics to details of what's happening between governments in the international arena, he explained at a recent conference here.

Geared toward noncommercial uses, the college-based data bank collects information from national sample surveys, election studies, various university-sponsored studies and such polling agencies as the National Opinion Research Center in Chicago. Currently, the information storehouse has gathered details on more than 700 different topics.

The collection capacities of the consortium are important because of the expense involved in conducting a legitimate opinion survey and the value of the resulting information to the social and nonsocial scientist. A typical survey of 2,000 to 3,000 people on any given topic costs about \$500,000, Marks noted, and considerably more if the questions are highly detailed and

the polling techniques sophisticated.

Also, since survey data cannot, for the most part, be duplicated, researchers can use the same information but arrive at totally different conclusions.

ICPSR uses a number of computers to process collected data and disseminate it to its members. The group originally relied solely on an IBM 360/40, which it still uses to some extent, but now does the bulk of its processing on an Amdahl Corp. 470V/7 at the University of Michigan.

The consortium also has a Prime Computer, Inc. 350 minicomputer that does some of the preliminary word processing and "data cleaning" operations before information is input to the mainframe via a 4,800 bit/sec communications line.

### Researchers Aiding Researchers

Members can access the system over the Telenet Communications Corp. network, but retrieving the information is difficult because the organization relies on manual, library-type bibliographic techniques rather than computer indexing.

Since ICPSR's researchers select and edit the information input to the data banks, they also aid other researchers with requests. The consortium has found that these "knowledgeable people" are more able to deal with the demands of other researchers than any current computer retrieval system.

The objective of the ICPSR system is to provide academic researchers with access to these surveys and opinion samplings, while having the institution or school bear the costs. The current fee for a Ph.D.-granting university is \$6,400 per year with unlimited access privileges and \$4,100 per year for undergraduate institutions.

## Computer Security Breaches Viewed Difficult to Assess

By Jeffry Beeler  
CW West Coast Bureau

NEW YORK — Various attempts have been made to assess the risk of computer room security breaches, but few if any of those efforts have ever succeeded, according to SRI International, Inc. consultant Norman R. Nielsen.

Speaking here at a recent conference about risk assessment techniques, Nielsen attributed the failure of most security breach studies to two causes:

- The inability of most managers to gauge accurately the likelihood that a given type of violation will occur.
- The difficulty of measuring quantitatively the damage from certain kinds of security invasions.

In most conventional risk assessments, managers identify the potential threats to their DP facilities and then try to assign a probability factor to each item. The resulting estimates cover a range of hazards, from relatively rare occurrences like natural disasters to comparatively common incidents like power failures.

After estimating how frequently each threat is likely to occur, managers try to estimate the dollar loss each misfor-

tune would inflict if it ever struck.

Unfortunately for most DP personnel, a recent SRI study of attempts to assess threats to computer security shows that most managers lack a firm basis upon which to estimate the incidence of many privacy risks, Nielsen reported.

Further, the research indicated that damage from certain kinds of system security breaches is difficult if not impossible to express monetarily. Managers can fairly easily arrive at a dollar figure for the loss of a mainframe or some other piece of equipment, but the price of compromised data security seldom proves as simple to compute, Nielsen noted.

Spurred by these research findings, SRI developed an alternative method of assessing the risks of system security breaches, he reported.

Using this method, the research institute gathers data on reported violation and the security flaw that made the intrusion possible.

SRI then combines the collected data to form a risk estimate the institute calls a Relative Impact Measure, Nielsen explained.

# Raw Data Sought for Congressional EFT Study

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — The coordinators of a congressional study on electronic funds transfer (EFT) are seeking public participation in gathering raw data for the project.

The study, now under way at the congressional Office of Technology Assessment (OTA), will rely to a great extent on existing data because of time and funding constraints, according to OTA senior analyst Al Shavell.

Shavell, who is director of the EFT "assessment," told a June 25 meeting of the EFT Association that the purpose of the study is to pick up where the National Commission on EFT left off two years ago, not to duplicate the work of that commission.

The study's final report is due Jan. 1. Only \$400,000 has been budgeted for the project, a small amount for a project of this scope, according to Shavell. "What I need in the worst way," he said, is the "information that is scattered around the [EFT] industry."

OTA will put together information on the development of EFT since the EFT commission finished its work. The agency will then "identify for Congress the alternatives that are open to it" when considering legislation that will affect the EFT industry.

The study will also identify expected consequences of choosing any particular alternative, Shavell explained.

The EFT assessment is part of a larger national information systems assessment currently in progress at OTA. Besides EFT, that study will examine U.S. Postal Service involvement in electronic message services and look into the National Crime Information Center and Computerized Criminal History projects [CW, May 28].

## Worried About Sources

"I wake up every morning and say: 'Where is the data going to come from?'" Shavell said, describing the task confronting the EFT assessment group. To produce the needed data, OTA will issue a number of contracts for outside research and rely heavily on information supplied by the private sector.

According to a description of the assessment supplied by Shavell, "the initial [data gathering] efforts will focus on contacting individuals and organizations who are known to have already collected and organized substantial amounts of data and are in a position to make them available to this project. When data sources are found to be

lacking, a nonrandom sample of institutions offering EFT services will be asked to provide selected data items."

Data is being sought on the following questions:

- How prevalent are various EFT offerings?
- To what extent are various groups making use of EFT services?
- How large are the populations to which various EFT services are being supplied?

Shavell is looking for information on the number of people who have been issued access cards for automated teller machines, for example; how many are using these cards; and the demographics — geographic location, age, sex, salary levels, etc. — of the users.

"I am in a position to accept data on a

confidential basis," he said, indicating he could use relevant data as background information if requested by the donor. Existing studies or volunteered information will otherwise be identified by source.

## Effort Scaled Down

The assessment itself has been scaled down from the original working plans prepared when the study got underway a few months ago [CW, June 4]. The early plans had been to ambitious, considering the short time frame for the study, according to Shavell.

According to the revised plans, the study will focus on five topics:

- Availability of and access to EFT services — the ability of various, identifiable groups to receive these ser-

vices.

- Protection of the personal property and privacy of users. Shavell noted that in this context "user" includes corporate and organizational users as well as individual consumers.

- User economics — what the user wants from EFT services, the economic arguments for and against EFT.

- The role of the government as a regulator and as a user of EFT.

- EFT as it relates to broad economic issues — employment, productivity, energy conservation, impact on the Postal Service, etc.

Shavell urged those with information relevant to the EFT assessment to contact him as soon as possible. He can be reached at the OTA, Washington, D.C. 20510 or by phone at (202) 225-8577.

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## MEDICAL CENTER TO ISSUE RFP

Loyola University of Chicago Medical Center, a 531 bed teaching hospital with clinics serving over 215,000 outpatients annually, is preparing to release an RFP document for acquisition of packaged software. The software must be IBM 370/OS compatible and must provide inpatient billing, outpatient billing, accounts receivable, health care log processing, revenue management and financial reporting. Parties interested in being added to the RFP distribution list should submit company name, address and phone number to:

Arthur West,  
Loyola Univ. Medical Center,  
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2160 S. 1st Ave.,  
Maywood, Illinois 60153;  
Telephone: (312) 531-3073

The RFP is expected to be released on or about Friday, June 15, 1979. This notice is not a request for proposal.

## Managers on the Move

WILLIAM S. FINKELSTEIN has been promoted to vice-president of Security Pacific National Bank's automated DP department. He was formerly the department's assistant vice-president.

An alumnus of the University of California, Finkelstein joined the Los Angeles bank in 1971 as a senior software systems programmer.

\*\*\*

PERRY CHARTIER has been named manager of DP operations at the Canon Electric Division of International Telephone and Telegraph Corp. in Santa Ana, Calif.

Chartier came to the division from a computer operations supervisory position at Smith Tool Co. Previous to that,



Finkelstein



Chartier



Ice



Fort

he held positions at Data Specs, Inc. and the Bank of A. Levy.

\*\*\*

EDWARD LAWRENCE has been promoted to vice-president of infor-

mation systems at Eastern States Bankcard Association, Inc. in Lake Success, N.Y. He will be responsible for all systems and programming, major systems development activities and special corporate projects.

Lawrence has been a senior systems analyst and assistant vice-president of information systems since he started working for Eastern States in 1973.

Lawrence attended City College of New York.

\*\*\*

JAY YOUNT has been named DP manager at Quality Farm and Fleet of N. Muskegon, Mich. He has been DP operations manager of Huffey Corp.

Yount earned a degree in electronic data processing from Sinclair College in Dayton, Ohio.

\*\*\*

JOSEPH ICE has taken over the post of systems supervisor at the Quaker Maid Division of the Tappan Co., Leesport, Pa., with responsibility for Quaker Maid's computer activities.

Ice previously worked as a system analyst for American Color and Chemical Corp. in Reading, Pa., and as DP manager for Dodge Cork Co. of Lancaster, Pa.

He has completed courses given by IBM and Univac and attended the International Tabulating Institute in Philadelphia.

\*\*\*

JAMES M. BECK has been named to the newly created position of corporate vice-president of management information systems for Holiday Inns, Inc. in Memphis. He will be in charge of systems and DP activities for the company.

Since 1973, Beck worked as division general manager and director of operations at Outboard Marine Corp. He holds a B.S. degree from Purdue University and an MBA from the Harvard Graduate School of Business Administration.

\*\*\*

JOHN FORT has been appointed director of management information services at Davy Powergas, Inc. in Lakeland, Fla.

Fort joined Davy in 1977 as manager of management services in charge of the company's Common Systems Development Group. Before that, he served as systems manager for Tenneco Oil Co.

Fort holds a bachelor's degree in economics from Lamar State University.

\*\*\*

RICHARD J. MULLIN has been named a vice-president of B. Altman Co. of New York City.

Mullin joined Altman's in 1947 and is director of management information and systems and assistant treasurer.

In the middle of his college career at Manhattan College in 1941, Mullin was drafted in the Army Air Corps. After five years, he returned to the school and completed a B.A. degree in 1947.

\*\*\*

THOMAS CRABTREE has joined Systems and Computer Technology Corp. as the firm's computer center director at its Black Hawk College site in Moline, Ill. He will be responsible for the college's DP operations.

A former associate director of systems and operations at the University of New Mexico, Crabtree holds a B.S. from Northwestern University.

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CW 7/9

# Keep It Simple, Home System Makers Urged

By Marcy Rosenberg  
CW Staff

LOS ANGELES — For computer technology to be embraced in the home or office, "the complexity of systems should lie somewhere between doing a load of laundry and making a tape version of a record album."

Putting it another way, Hank Koehn, vice-president of futures research at Security Pacific National Bank here, stressed that computer systems must be designed to adapt to people, not the other way around.

Unfortunately, most home computer systems on the market demand that a person have an advanced understanding of what a computer can do and an intermediate level of programming ability, Koehn claimed. "Even asking

the casual home user to go through a command language is asking too much," he emphasized.

The impact of such requirements on the user is ignored in glowing home computer market growth projections that assume the increasing number of technical, business school and liberal arts college students who graduate with computer experience will want to program a home computer.

Quite the contrary, Koehn asserted. "The ability to program doesn't imply a willingness to do so at home," he maintained, adding that as a former programmer himself, he would "consider it an horrendous waste of my personal time."

The computer industry, he stated, displays "a lot of arrogance concerning

its technology. DPer consider it an art form and expect all users to become artists."

He pointed out, however, that in a high-technology society, people are not interested in how the technology works — what they want are immediate results.

"We have developed a threshold of tolerance of about five seconds," Koehn said. "We expect to turn on radios and get news and weather; we expect to drive to work with no inconvenience. But we become incensed when we stall on the freeway or can't get a telephone call through."

With this in mind, Koehn envisions the marketable home computer as an "information appliance." A flick of the switch and a single command, such as

"home budget," would activate the system.

## Office Outlook Poor

Koehn applies his "keep technology simple" manifesto not only to the home but also to the office, where the need for automation will reach acute proportions in the next 10 years.

Why? According to Koehn, the 1980s will show symptoms of the declining birth rate, resulting in a shortage of 18- to 22-year-olds, the age group that usually fills such entry-level slots as bank tellers and office clerks.

Such a shortfall would make the next decade a prime time to computerize these "Mickey Mouse" jobs — as he calls them — forcing office workers and consumers alike to use computers.

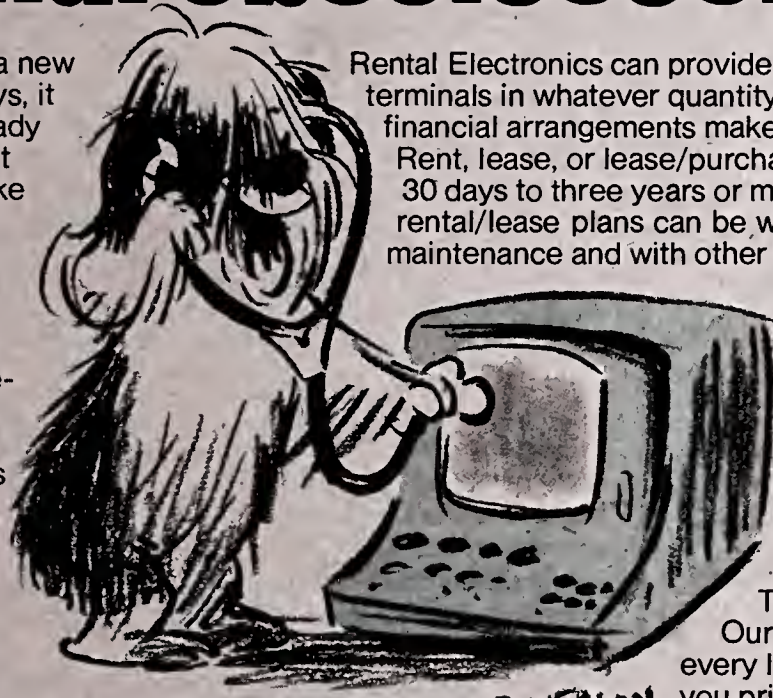
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CW 7/9/79

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# EDITORIAL

## Good News . . . and Bad

The first user experience with the IBM 4300 line is now in [CW, July 2] and it appears the system is all it was cracked up to be when announced in January.

According to that first user, the system has "amazing power" with "significantly faster console operations." IPL was described as "a piece of cake" with the system.

When the 4300 was announced, many commentators lauded the claimed performance of the new unit and it appears that IBM has lived up to all of its early claims — quite a feat since the system establishes a whole new price/performance curve for the industry.

Congratulations are in order for the giant mainframe for delivering the 4300 on time and for once again setting the price/performance standard for the industry.

Unfortunately, the good news of the excellent 4300 performance is offset somewhat by the long production and delivery schedules.

Many users must feel a great deal of frustration when they read the glowing reports of others lucky enough to get an early 4300 delivery date — especially if they won't be getting their first machines until 1981 or 1982.

## Unavoidable Nuisance

Readers occasionally take us to task for sending them duplicate mailings requesting that they subscribe. In some cases, people get as many as five or six letters — even if they already subscribe.

Many readers wonder why we don't use computers to eliminate those duplicates.

Generally, it is impossible to eliminate duplications because we are not in control of the names used for the mailings. It works like this: We purchase a mailing list from some outside source. That source delivers the mailing labels to a mailing house, which attaches them to our promotional material. We never have physical control of the list and are not given it in machine-readable form.

This procedure is used to prevent copying in the highly competitive list rental business.

So if you get several promotional pieces from us, it probably indicates your name is on a lot of lists because you belong to a number of professional groups and are quite active in the computer community.

Please pass the duplicates along to friends. We would eliminate them if we could.

## DATA PAST

Five Years Ago  
July 10, 1974

NEW YORK — A large company here took delivery of a new IBM 370/158 only to find it could not afford to install the system. The idle 158 was a victim of tight money about to affect many users, especially those who hoped to arrange third-party leases.

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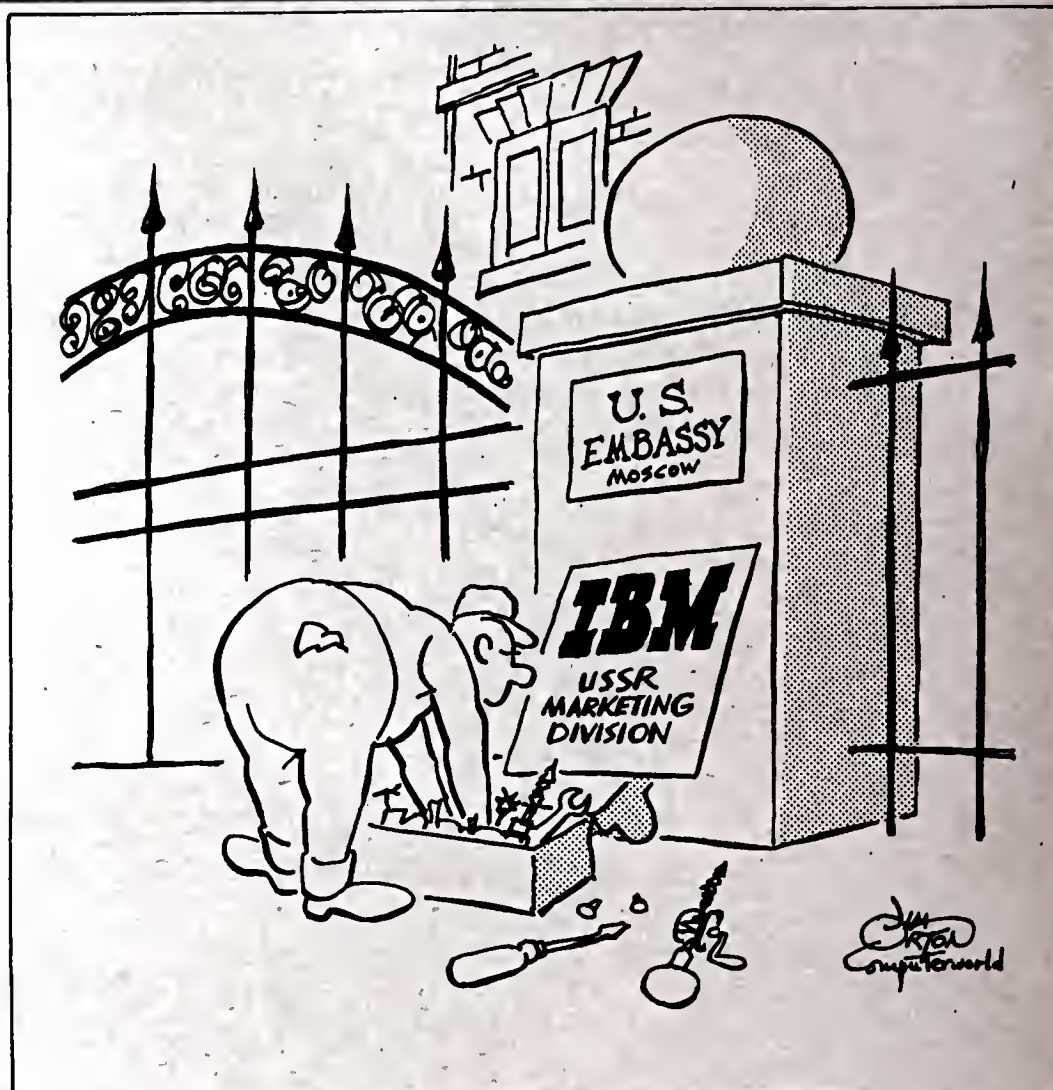
ARMONK, N.Y. — IBM decided to buy its way into the domestic satellite arena with a regulated common carrier subsidiary if the Federal Communications Commission approved. The proposed joint venture satellite firm would be formed from the one-third interest held in CML Satellite Corp. both by Lockheed and MCI. Comsat General, owning one-third interest in CML, would become a partner in the company.

Eight Years Ago  
July 14, 1971

WALTHAM, Mass. — IBM 360/20 users thinking of upgrading to the System/3 got an alternative with in Honeywell, Inc.'s announcement of the Model 105. The \$1,700/mo system even boasted a bundled software package to translate the 20's RPG programs to Honeywell RPG.

---

WASHINGTON, D.C. — The Federal Bureau of Investigation's well established computer network won what appeared to be its first legal test. In a recent federal case, a defendant claimed that using the National Crime Information Center could contribute to an illegal search. A federal court ruled for the government in U.S. vs. Golembiewski.



## LETTERS

### No Nuts-and-Bolts Job

In reference to Jack Stone's derogatory comments of June 18, I am repelled by discussions of "programmer productivity." Would Jack recommend measuring Michelangelo's productivity by counting the number of brush strokes per hour expended in painting the Sistine Chapel ceiling?

Productivity measures quantity, not quality. Such measurements are meaningless when we count the number of bolts per hour tightened by an assembly line worker in an auto plant. They are not applicable to programmers.

A skilled and dedicated senior programmer will conceptualize his programs creatively in the middle of the night while trying to fall asleep. Using advanced techniques, his programs will have less code than those written by juniors and trainees.

He will spend more office time reviewing and finalizing specs with analysts and users and, therefore, less time revising the code. But despite his superior performance, Stone would stigmatize him with a "low productivity" label.

And finally, there are periods of feast and famine, times when everybody's productivity is near zero because the programs are all debugged and operational while the new proposed systems have not yet been approved. Does Stone suggest that at such times all programmers be reassigned to tightening bolts?

Morton Burdman  
White Plains, N.Y.

### Mixed Priorities?

Milliseconds, microseconds, nanoseconds. The efforts of computer hardware manufacturers to beat their competitors by these fractions of time are insurmountable. Programmers, analysts and equipment suppliers spend endless hours in studies, benchmarks and evaluations to better com-

puter throughput by fractions of seconds.

Doesn't it then seem strange that a user will ask an operator when he can get a simple listing and the answer is "Maybe today." Isn't it odd that a programmer, when asked the status of a program, will answer, "I don't know, we are debugging."

An inquiry to an analyst about a new system may get a reply, "Sometime next year." The supplier of hardware, after wining and dining you to prove he can save you two billionths of a second in processing time, finally gets the order and tells you to expect delivery of the new processor in about 18 months to two years.

Are the milliseconds, microseconds and nanoseconds really that important or are we focusing our attention into outer space?

Carlos L. Davis

Dayton, Ohio

### Answer to NCC Problem

The reason the National Computer Conference technical sessions were not well attended is self-evident. It's like the executives of CBS or NBC wondering what's wrong with the Nielsen ratings of their shows appearing opposite ABC's "Charlie's Angels."

The answer is: "You've gotta pick another time slot!" The NCC's technical sessions are going against too tough an act, the NCC exhibits themselves. And it's as frustrating for the potential technical session attendees as for the disappointed speakers.

A possible solution is to start the technical sessions on a Saturday and run them through Friday. Start the Personal Computing Fair on that Friday and run it through Sunday. Or perhaps have the technical sessions in the mornings and open up the exhibits from noon to 10 p.m.

W.B. Grant

Montclair, N.J.

Other letters on Page 23.

## HUMAN CONNECTION/Jack Stone

# Managers Seek Loyalty First, Reader Says

Although we often fail to appreciate them, this industry is sure filled with some wonderfully clear-thinking people.

Bill Delaney, president of Analysis & Computer Systems, Inc., a computer services firm in Burlington, Mass., has taken the time on a number of occasions to reflect on my writings and forward his comments to me.

This time, Bill wrote me about my June 4 article on "cronyism."

First, he expressed his views about programmer promotability:

"... In the article, you quoted an unhappy programmer who believed his or her boss was promoting based on friendship, not performance. What's so surprising? It happens every day!

"As you said later in the article, you have no way of knowing if the situation described was all true or not. The

'complainer' may not know what the boss knows, and other factors above and beyond sheer technical ability have to be considered. Many technical people who are great working alone with coding couldn't lead a group of boy scouts to the men's room without losing a few.

"Schedules, budgets, directing others, training, client relations, marketing, selling ability and personality are just a few of the factors that come quickly to mind when one is considering promoting a good programmer up the ladder into the management ranks.

"Generally, only one or two out of 10 ever work out at the higher management levels. The most common reason for failure is the person himself failing to recognize that technical or programming ability alone is not enough at higher levels. The star player is not

necessarily (and probably won't be) the best coach. They are entirely different jobs."

## From 'Promoter's' View

Then he went on to describe "cronyism" from the perspective of the promoting manager:

"... As for 'cronyism,' why not? If you were a senior manager who had to promote someone to a higher position, yet still subordinate to you, would you select someone you don't know or you don't like? Hardly!

"There are very few senior managers who will promote only on the basis of friendship, and ignore all other requirements. If he or she does this very often, their careers will soon be cut short. 'Cronyism' generally comes into play when the list of people under consideration for promotion has been

gone over carefully, and only several remain in contention. Then, the boss may select Mary or Joe or Al, because he or she likes one of them very much and can get along with one better than the others.

"The ability to get along with other people is so important to one's career that it is a shame so many good programmers don't spend a bit more time trying to understand this basic fact of life. It is true in personal and business life, as well.

"Just because you can write a 15-level nested "DO loop" faster than anyone else does not in any way qualify you for a higher management position.

"Having higher authority admire you and want to promote you is about the quickest road I know up the ladder. I have seen managers promote on merit alone, whom they didn't especially like, and, in most cases, the relationship failed to 'jell.' "

Bill related his own experience as a technical person trying to move ahead in the organization, to illustrate his points:

"Early in my career, I learned this lesson the hard way. I concentrated totally on the technical aspects of my job. I was good at it. I knew my job and took pride in my technical ability, but I noticed a few things began to occur.

"First, I was usually given the most difficult jobs to do. They required a lot of time and effort. Second, other people came to me for help, that I will-

(Continued on Page 22)

## READER COMMENTARY/Joe Rigo

# Documentation Needs Changing

There may not be trends, as such, in system documentation, but there are shifts in emphasis.

Managers used to plead for lots of program documentation. Now their most urgent requests seem to be for functional specifications and cross-reference aids at the system level.

The functional specs are usually for an old system. The company wants to replace it after many years of faithful service, but no one is sure what it does.

The situation is similar in any new project. The first step is to document the current system. Then it is possible to develop requirements and design specifications for a replacement.

It's just that the job is tougher when the current system is on a computer. In most cases, the original designers remember nothing at all. The maintenance programmers know parts of it very well and other parts not at all.

## Double-Ended Effort

So the documentation effort starts at both ends. One end interviews users to find out what they think the system does. The other end begins studying a stack of old programs written in RPG, converted RCA Cobol and Adpac.

It can be helpful in these situations to build a data element dictionary. Maintenance programmers have been doing this for years to get into an unfamiliar system, although they never gave their worksheets such a dignified name.

The idea is simple enough. Identify all of the input fields and output fields and track them through the system. Follow them from file to file and from program to program.

The resulting dictionary lists each field. It identifies fields that enter the system on user input forms and emerge unchanged. For others, it gives the source and a summary of all of the calculations that finally produce the output value.

The end product is a thick document that fairly well summarizes what the system is all about. It makes a good spec for the next system because it

contains minimal implementation information. It completely ignores all of the code that was created solely to make big programs fit into little specs.

## Reverse Image

Our new systems have a reverse image. They have big virtual spaces and lots of little pieces. That may be why managers are crying for cross-references. It is hard to keep track of all the elements in a system.

The old system had three programs and two files. The new one has a dozen programs just to edit the data entry screens.

The ideal document might be a giant wall chart. It would run a list of user input data forms down the left side of the wall and a list of reports down the right side.

The space in between would be a jumble of programs, files and arrows. Perhaps it might include color photos of the user staff members who review data entry control totals before authorizing a batch run.

For small wall people, the system flowchart is surviving nicely as a cross-reference tool. It combines a lot of information on a single page. There is room for system mnemonics, English translations and comments.

The only trick is to use several flowcharts. Put each batch run on a separate chart. Give each on-demand report a chart of its own. Don't crowd the whole system together in detail.

A single chart for a data entry job can supply a great deal of consolidated information, such as:

- Identification of the user input form.
- Names of the input screens, along with comments giving selection criteria for each screen.
- Name of the program that puts up a screen and the names of any other programs that it invokes.
- Names of files accessed and created.

- Names of any programs to edit and list the input.
- Identification and disposition of the file of input data.

That's a lot of information for one page, and it doesn't even require any writing talent.

Rigo is president of Sysdoc, Inc. in New York.

## THE TAYLOR REPORT/Alan Taylor

# Users Poorly Protected In Contract Breach Cases

DPers need to know about other general areas in computer contracts beyond the dangers of the secrecy provisions, previously dealt with here [June 11]. In particular, the inadequacy of the remedies available to a wronged user is too often overlooked.

Contracts spell out not just the terms that are agreed to regarding actual operations, but they also often cover further agreements as to what will happen if things go wrong. This second agreement can be called a "seat-belt" agreement.

In the case of computer contracts, the "restraints" associated with a breach of the contract have the same function as seat belts. They are there to prevent additional injury after a crash. However, if the restraints are not spelled out and understood, a user can find himself helpless when a vendor breaks a contract.

From my experience, this helplessness, rather than original breaches, is the biggest problem with computer contracts. So let us look a little more carefully at the remedy provisions in a typical contract.

Typically, the vendor's remedies are secured. A user's failure to pay in full and on time is sufficient to bring into play draconian remedies to protect a vendor's interests. In contrast, a user's remedies are either specifically limited or nonexistent and rarely provide for even the barest continuation of essential services.

In practice, this imbalance is considered unfair by both user and vendor representatives. However, overreliance upon what a vendor may consider "fair" can be just as disastrous as if the vendor just goes in accordance with the terms of the contract. One case of this involved a computerized construction company, ISC, and a computer vendor (now deceased in that regard), Xerox Corp.

Xerox started out totally wrong by offering an impossible contract — including operation in a 20-line environment (ISC was pro-

(Continued on Page 22)

# Loyalty Ranks First With Bosses, Reader Says

(Continued from Page 21)

ingly gave, but I told no one about it, not even my boss. Third, one of those whom I used to help on a regular basis got promoted over me to a higher position.

"I asked my boss why and was told I never communicated with higher management, whereas the other fellow did. They knew him and liked him. As they didn't know me personally, they offered him the higher position. He did very well in the new job. It was less technical.

"As a result, in my future work, I took on jobs that were technically easier and gave me time to visit, talk with and get to know higher managers on a personal basis. The result? Promotions came my way rapidly. I would

even seek out opportunities for advancement and go and ask for them.

"It amazes me still what one can get by the simple expedient of going in and asking for whatever it is one wants. Many times people don't get jobs because they show no interest in them and the bosses conclude they may not want it and may not even care enough to ask about it, then you can't want it very much. They would rather give the job to someone who seems to want it, over another who shows no interest."

Bill closed on a contrast between "loyalty" and "cronyism":

"Surveys indicate that, for better or for worse, the single most desirable characteristic higher managers look for

and reward in subordinates is loyalty. This has little, if anything, to do with technical ability, but it is a fact of life.

"It follows, then, that most of us look for and hope for loyalty from people we know and like (we are sometimes disappointed though), and who, we believe, like and respect us in return. I guess this can be called 'cronyism,' because it really is.

"Selecting someone you don't know, or worse, someone whom you don't like and who doesn't like you, can and will generally result in a disaster and, unfortunately, the subordinate generally pays for his superior's errors.

"That's life, Jack, and it is not fair, but as President Kennedy once said, 'There is no law that says life has to be fair. Life is just life.' "

## User Protection Lacking

(Continued from Page 21)

viding computerized construction services over communications lines). The Xerox representative was indulging in the game of offering whatever the user needed — and better services than the

next vendor — so there is no real doubt that the offer was fraudulent as well as impossible. However, Xerox only at the time found out about its impossibility and didn't see the fraud situation.

To meet the situation, the Xerox lawyers worked out a trap for ISC, which wanted the original contract fulfilled as promised. Knowing this was impossible, but not telling ISC, the Xerox lawyers set about getting a release from ISC. This they did under the guise of "amending the contract" to help ISC remain financially viable.

Later ISC took Xerox to court and won \$97,500. But that took six years, and ISC was ruined in the meantime.

In retrospect, Xerox felt that its actions after it found it couldn't perform were fair. The chairman, C. Peter McCollough, said so after the verdict against the corporation. He thought it was fair, then, that the Xerox representative negotiating the settlement had not been told about the Xerox trap until after he protested Xerox's rejection of an ISC version and that Xerox totally concealed its knowledge that the system offered was impossible.

And that Xerox could delay paying damages for six years in the courts, while the user went to ruin, did not seem unfair, even in retrospect.

ISC, on the other hand, felt Xerox was unfair in concealing its inability to perform.

This, then, is the type of thing that happens when a contract's performance is protected only by a vendor's opinion as to what is fair.

The risk of this type of protection — which cost ISC six years and many dollars — is too high for any computer installation I know. And, while Xerox's actions were particularly ghastly, in the first instance, the original breach was really immaterial.

If it had been an argument about service timing, software maintenance or anything else, ISC would have had just the same problem in forcing the vendor to perform or to come clean.

Contract breaches are *always* possible, and computer contracts, like any contracts, when broken only give the user the right to complain. The effectiveness of the complaint process is the strength or the weakness of the contract.

Merely leaving matters to the courts — even when they will eventually award damages — is wholly inadequate in keeping a computer installation protected. If your contracts have no better remedy clause than this, they are inadequate and everyone (including management and lawyers) should know!

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LETTERS

Show Must Go On

This is in response to the June 18 editorial regarding the weaknesses of the National Computer Conference.

In the first 10 years of my professional career, I went to several computer conferences a year. I attended as many sessions as I could, listened attentively to the papers and perused the printed proceedings. In general, they were not satisfying experiences (even though I helped run a few of the conferences).

Finally, I figured out what conferences are good for: to meet your colleagues in the business, to meet your friends, to see exhibits of the latest wares, perhaps take a tour. Conferences are *not* good for transfer of new technical information. Why not?

1. Because the lead time for the submission of papers is such that anyone with something important to say won't wait approximately eight months to say it!

2. Because a large percentage of speakers are inept, boring or both.

Conferences may be OK for state-of-the-art reports and for tutorials. Personally, I would rather get my technical information from reading, where I can go at my own pace rather than at the speaker's pace.

Panel discussions are sometimes enlightening because people often will say things in public which they won't write down for publication. However, the overall conference fee is too high a price for a few panel discussions.

I have in the past suggested to others that the formal presentations are rather useless. The response is that there has to be a show of technical information transfer in order to get management of organizations to authorize the time and expense for conference trips.

So there it is in a nutshell: the formal show has to go on, however useless it may be, in order to get attendees.

Is there a format that might work better? I would be interested in workshops, in each of which a technical issue was discussed by those familiar with it and attendees with practical problems were encouraged to participate in the discussion.

Philip R. Bagley  
Narberth, Pa.

Roots of NCC's Problem

Since you requested feedback on people's failure to attend the National Computer Conference sessions, here is my opinion.

1. Too many to choose from. Even though we are decision makers, we can only handle so many alternatives.

2. Too lengthy. Because of the cost, usually only one person can go, so sessions must be short (one hour maximum).

3. Too big. Pick a smaller city with a better reputation.

4. Too expensive. New York is extortion.

5. Too technical. Academia.

6. Maybe too frequent. Have fewer sessions, but biannually have a whopper.

The competition for a manager's time is great with many alternatives to these sessions. We can attend free local seminars from vendors; pay \$500 to \$600

for a five-day session on the subject of our choice in our own city; attend the Caravan for hardware; or read *Computerworld* to gather an awareness of what is happening.

E.R. Tauber  
Franklin Park, Ill.

Chill in the Air

Here are two items which may also have contributed to the poor attendance of the National Computer Conference technical sessions:

• Coldness in the ballrooms. I spent three days in the technical sessions. Most of these were held in the ballrooms. For example, I spent an entire day in the Regent Ballroom at the New York Hilton. By the time I got out, I was shivering while wearing a long-sleeve dress and a lined raincoat.

I have mentioned this situation to the hotel people. They think only conference officials should make requests for higher temperature. Evidently, no one observed this or requested adjustment.

• Paper listings in the proceedings and technical session program. The papers in the proceedings were listed according to subject. There were no cross-listings of authors and sessions. But in many instances, a single session covered three papers, all listed under different subjects.

Only a handful of attendees obtained the detailed lists of papers and authors in the session program booklet. I was preregistered, but I was not given this booklet. It becomes hard to preview the contents of the paper and determine which session is of most interest.

Dr. Elizabeth H. Yen

On TGIF Algorithms

Useful additions to the TGIF Algorithms in R.A. Cornish's article [CW, June 4] are the four parts of the Association for Computing Machinery Algorithm #199. These four computation-only algorithms convert dates to and from Julian day integers. The long version handles the 10 century span from 1582 to 2582. The short version handles the 20th century.

Carrying the Julian day integer instead of the date internally makes such tasks as determining the day of the week (via MOD function) or finding the number days between two dates trivial.

We have used these algorithms for several years. Their only drawback is the need to handle integers in the range  $-3 \times 10^6$  to  $+3 \times 10^6$ . This typically requires the use of assembly language code when they are implemented on minicomputers.

Larry Babb  
Mountain View, Calif.

Reverse as Well Forward

In response to the article on TGIF Algorithms [CW, June 4], I would like to submit the following three subroutines which document the reverse as well as the forward date conversion algorithms. The routines are written in Fortran and all arithmetic is integer.

This is a somewhat blunt presentation of what I believe are quite elegant algorithms, but the listings speak for themselves [See Figure 1 above].

David A. Cromley  
Cheyenne, Wyo.

```
FORTTRAN IV G LEVEL 21                                YMD1                                DATE = 79165
0001
C-----SUBROUTINE YMD1(IYR,IMO,IDYCT,IDYYR,IDYMO,IDYWK)
C-----INPUTS IYR - YEAR (1 TO 99)
C-----          IMO - MONTH (1 TO 12)
C-----          IDYCT - DAY OF CENTURY (FROM JAN 1, 1901)
C-----          IDYYR - DAY OF YEAR (1 TO 366)
C-----          IDYWK - DAY OF WEEK (1 TO 7, MON IS 1)
C-----
0002      LEAPYR = 2
0003      IF ((IYR/4).EQ.IYR) LEAPYR=1
0004      IDYYR = IMO*275/9+IDYMO-30
0005      IF (IMO.GT.2) IDYYR=IDYYR-LEAPYR
0006      IDYCT = (IYR-1)*1461/4+IDYYR
0007      IDYWK = IDYCT-IDYCT/7*7+1
0008      RETURN
0009      END

0001
C-----SUBROUTINE YMD2(IYR,IMO,IDYCT,IDYYR,IDYMO,IDYWK)
C-----INPUTS IYR - YEAR (1 TO 99)
C-----          IDYYR - DAY OF YEAR (1 TO 366)
C-----          IMO - MONTH (1 TO 12)
C-----          IDYCT - DAY OF CENTURY (FROM JAN 1, 1901)
C-----          IDYMO - DAY OF MONTH (1 TO 31)
C-----          IDYWK - DAY OF WEEK (1 TO 7, MON IS 1)
C-----
0002      LEAPYR = 2
0003      IF ((IYR/4).EQ.IYR) LEAPYR=1
0004      ITEMP = IDYYR
0005      IF (ITEMP.GT.(61-LEAPYR)) ITEMP=ITEMP+LEAPYR
0006      IMO = (ITEMP*9+269)/275
0007      IDYMO = ITEMP-IMO*275/9+30
0008      IDYCT = (IYR-1)*1461/4+IDYYR
0009      IDYWK = IDYCT-IDYCT/7*7+1
0010      RETURN
0011      END

0001
C-----SUBROUTINE YMD3(IYR,IMO,IDYCT,IDYYR,IDYMO,IDYWK)
C-----INPUTS IDYCT - DAY OF CENTURY (FROM JAN 1, 1901)
C-----          IYR - YEAR (1 TO 99)
C-----          IMO - MONTH (1 TO 12)
C-----          IDYYR - DAY OF YEAR (1 TO 366)
C-----          IDYMO - DAY OF MONTH (1 TO 31)
C-----          IDYWK - DAY OF WEEK (1 TO 7, MON IS 1)
C-----
0002      IYR = (IDYCT-IDYCT/1461+364)/365
0003      IDYYR = IDYCT-(IYR-1)*1461/4
0004      LEAPYR = 2
0005      IF ((IYR/4).EQ.IYR) LEAPYR=1
0006      ITEMP = IDYYR
0007      IF (ITEMP.GT.(61-LEAPYR)) ITEMP=ITEMP+LEAPYR
0008      IMO = (ITEMP*9+269)/275
0009      IDYMO = ITEMP-IMO*275/9+30
0010      IDYWK = IDYCT-IDYCT/7*7+1
0011      RETURN
0012      END
```

Figure 1. Three Subroutines for Data Conversion

| Old Steps | New Step | Procedure                                                                                            |
|-----------|----------|------------------------------------------------------------------------------------------------------|
| 4A,4B     | 4A'      | Divide (YR+1899) by 4 and store the quotient in Q <sub>1</sub> and the remainder in R <sub>1</sub> . |
| 4C        | 4B'      | Multiply Q <sub>1</sub> by 5 and store the product in R <sub>2</sub> .                               |
| 4D,4E,4F  | 4C'      | Add R <sub>1</sub> , R <sub>2</sub> and DAYS, subtract 1 and store the result in R <sub>3</sub> .    |
| 4G        | 4D'      | Divide R <sub>3</sub> by 7 and the remainder is DW.                                                  |

Figure 2. Compact Version of TGIF Algorithm

Simplifying Algorithm

The article "TGIF Algorithms" in the June 4 issue caught my eye, since I had hunted (successfully) for a day-of-the-week algorithm some time ago. Algorithm 4 in the article has an error in step 4B (the division should be by four, not two), but otherwise seems to work, at least for the dozen or so dates I tried.

Your mathematically inclined readers

will recognize that the algorithm can be simplified considerably by the recognition that "modulo n" arithmetic gets heavy usage in this algorithm and that for the modulo 7 arithmetic, considerable compaction of the algorithm can occur.

Without resorting to a complete dissection of the algorithm, here is an equivalent [See Figure 2 above].

James A. Brooking  
Schenectady, N.Y.

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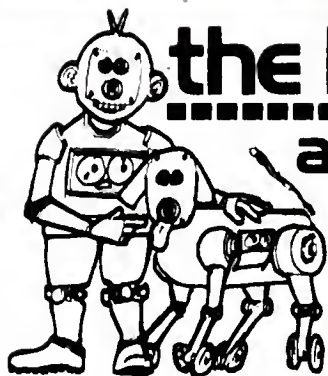
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# BIT 10 (BITS AND PIECES)

Lost in the wilderness on their journey to the Silicon Valley reservation, Hex and Execute have luckily stumbled upon a virtual store run by two androids where they have replenished their memory banks. When they sit down with their hosts, they are astounded to see they have "gone native" to the extent of smoking pot and employing a female human servant.

Hex learned from Davy Sprocket during the course of the conversation that he and his partner had once formed the Sprocket Bootstrap Corp. of America but that when that folded, soon after the Great Crash, they had become plain Davy Sprocket and Bill Bootstrap again and had been forced to seek their prospects in the outback. According to Davy Sprocket the tourist business had formerly boomed, but with the advent of wideband, full-



## the hexadecimal kid and his faithful dog ascii

A FANTASY  
IN SIXTEEN  
BITS

by  
Richard  
Forsyth

modality sensory transmission, demand had now slumped.

Hex told him something of the purpose of their trip, but omitted to mention Dr. Null, saying only that his bionic dog had gotten out of control and that they wanted to retrieve him before he did any damage. There was something about Bill Bootstrap that made him wary of revealing their plans.

He also asked whether they knew of

Old Ma Synapse, adding that they would like to pay her a visit and discuss Prof. Synapse's life — out of historical curiosity.

Sheriff Sprocket said that she was well-known as a respected elder of the tribe and suggested that he personally should lead them to her the following day. Hex gratefully accepted this offer of a guide with some local knowledge and, after a convivial evening during which he tasted Bourbon whiskey again for the first time in more than 20 years, he and Execute retired to the smaller of the two log cabins, bidding a cheerful goodnight to their hosts.

"How human can you get?" Execute asked as they prepared to sleep.

"Those two ought to be reported to the Data Base Administrator."

"I know," Hex replied in a benevolent haze, "but we are their guests. After all, what would you do if you were stuck out here?"

In the middle of the night, Hex awoke with a start, not because of the bugs crawling around the bed but because his information retrieval system, Dream (Dynamically Reorganizing Express Access Method), had stumbled across a highly relevant fact as it filed away the day's experiences for future reference.

"Wake up!" he cried excitedly, shaking Execute.

"What's going on?" Execute asked groggily.

"I've remembered something important," Hex said. "Bill Bootstrap is a fraud: that android is in reality 'Wild' Bill Bootleg, manufacturer of the moonshine minicomputer. Those two were banished out here for selling home-brew computer kits to humans.

"I wouldn't mind betting they've set up a business for supplying illicit processors to the people here. Pack up everything we've got. I think we had better make an early departure. If they realize we're on to their little game, it won't be safe for us to stay around."

Hurriedly, they packed their few belongings. As they were about to leave, there came a barely audible tap-tap-tap on the front door of the hut. In a flash, Execute rammed his bed against it and pointed to the window.

"You first," he whispered to Hex, and Hex began to scramble out of the tiny opening.

"I'm stuck," Hex called through clenched teeth as he struggled to squeeze through the narrow window frame. "Get me out of this!"

"Incompetent android," Execute growled and gave him a huge push.

Hex tumbled head first onto the sandy ground. As he was picking himself up, he could hear muffled footfalls of the intruder coming round from the door of the hut, then the kit bag that Execute had flung out after him struck him on the back and he slumped forward again. He rose shakily and dusted himself off.

Standing in front of him, lit up by the moonlight, was their midnight caller, the servant girl they had seen briefly the previous evening. Execute landed beside them with a loud crunch.

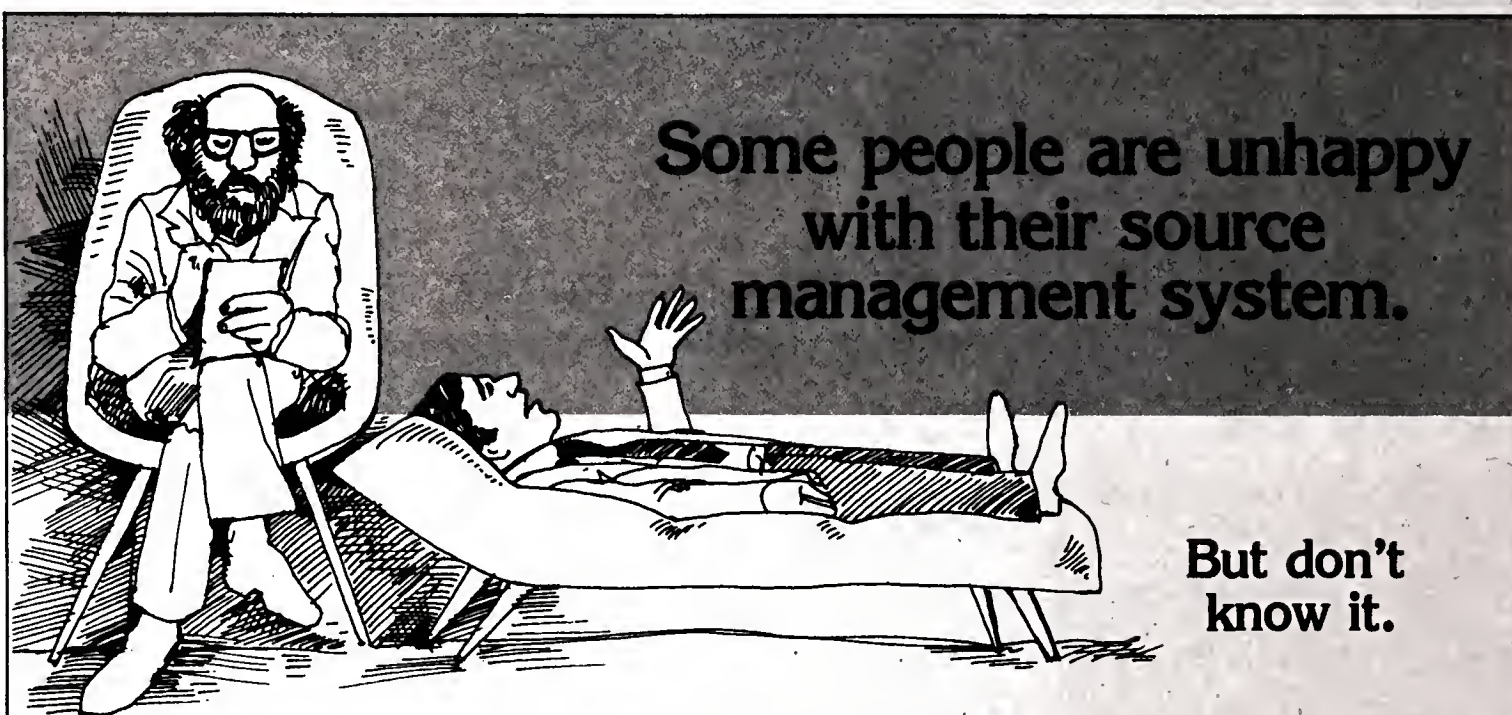
"I hope I haven't disturbed you," the girl said.

Hex and Execute just gaped at her. "I want you to take me away from here," she said.

They looked at each other blankly. Should they take the girl? How green was my valley? All will be revealed next week.

Forsyth is software manager for RAIR Timesharing in the UK.

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## GE Manager Reports:

# Notebooks, Audits Aid Development

By Don Leavitt  
CW Staff

NEW YORK — Top-down design. Chief programmer teams. Structured programming.

These are all good and useful concepts, but to be truly effective they must be supported by a disciplined approach to documenting the development process itself — while the process is under way.

That was the message carried by John McKissick Jr. at a recent conference here. To back his message, the manager of software quality assurance at General Electric in Syracuse, N.Y., also had the software development notebook (SDN) his organization uses.

"Significant benefits" have resulted from the use of SDNs at GE over the past three years, McKissick said. Software is developed in a "more orderly and disciplined way." The emerging software product is "visible and auditable."

Beyond that, deficiencies are identified and corrected earlier. Documentation — in the conventional sense — evolves in the required format, and software and documentation are more consistent, he said.

### Loose-Leaf Notebook

Getting down to specifics, McKissick explained that the SDN is a loose-leaf notebook which provides a common collection point for all current information relating to a "computer program component" — any part of a program that is being developed and initially compiled on a stand-alone basis. There are nine carefully defined sections in each SDN, so anyone who is accustomed to the approach can immediately work with any of the notebooks.

Like so many commercially available project management systems, the SDN forces the development team to keep track of its expectations and its accom-

plishments. And it provides a vehicle through which variances between expectations and accomplishments can be highlighted and, if appropriate, corrected.

The SDN sections progress from status sheets — which document the schedule, completion, approval and audit status of each phase of the development cycle — through requirements, detailed design specifications, functional capabilities and a cross-reference to the location of the latest program listing.

The second half of the book encompasses test case descriptions, test case results, a software problem report log, a software change order log and miscellaneous notes.

### Discipline a Benefit

While the sections of the SDN follow what have become conventional lines, McKissick said the discipline imposed by the notebooks — the definition of what is in each section and, per-

haps more importantly, who is responsible for maintaining the information so that it is current — has been the greatest benefit of their use.

The person responsible for the program component sets up the basic SDN, including the schedule in Section 1 and allocations of resources down to the routine programming level. That person also handles the updating as the allocations or requirements change.

Much of the rest of the book rests in the hands of the programmers. Keeping the SDN technically current, readable and compliant with the organization's software standards is an ongoing programmer responsibility, McKissick said.

### Early Audits

Compliance is just one of the factors that are checked with the SDN audits. Audits must be an element in a comprehensive quality assurance plan, and they should be conducted by individuals who are organizationally independent of the software developers, he stressed.

But McKissick wasn't talking about just postimplementation audits. He said the checkups he had in mind should begin early and continue throughout the entire development process. They must be professionally planned, conducted and documented; corrective action, if needed, should be followed.

## Datapoint Catalogs Applications

SAN ANTONIO, Texas — An Application Software Catalog that initially lists 132 programs developed by and now in use at Datapoint-oriented installations has been released by Datapoint Corp.

The program write-ups follow a format, including a narrative description and detailed specific points, and an index provides cross-references to packages with similar goals so comparison is simplified, a spokesman said.

In addition to the narrative, each write-up shows the name and address of the developer, the number of programs in the package, the language in which they were written — largely Databus — and whether source code is available. It also shows the date the software was first installed, the number of installations and the minimum hardware required as well as giving price information.

The spokesman was quick to point out that Datapoint has not tested all the software listed, that

it has no desire to provide recommendations and that it will not serve as a middleman between vendors and potential users. All negotiations are expected to be between user and the contact named in the product write-up.

Datapoint is willing to update the catalog if vendors wish to add new products or revise descrip-

tions of existing ones. In that way, users will be able to keep current on what is available for applications on Datapoint gear.

The catalog is available free to users who address their requests on a company letterhead to Datapoint Corp. Marketing Communications, 9725 Datapoint Drive, San Antonio, Texas 78284.

## 'IV\$AM' Reduces Vsam Overhead

MILWAUKEE — An IBM-oriented utility designed to cut the overhead associated with Vsam without modifying Vsam itself in any way is now available from Dasd Corp.

The IV\$AM package was developed by Quebec-based Oliver, Ouellette & Morin Inc., a Dasd spokesman noted.

IV\$AM intercepts calls that would normally go to Vsam from user programs written in Assembler, Cobol or PL/I. If the call is to get data from disk and IV\$AM determines the data is already in memory, it "tells" the re-

questing program where it is.

If the data is not in memory, IV\$AM sends the request along to Vsam itself. The cutback on Vsam overhead will vary by user and perhaps by application, but CPU throughput has been improved 50% and EXCPs cut to one-seventh of their former counts in some installations, the spokesman claimed.

The "enhanced interface" between user and Vsam will not infringe upon the integrity of IBM access method coding, he stressed. The only required modification to existing application

programs is the replacement of normal Vsam I/O routines with IV\$AM calls; since these are parameter-driven, little knowledge of Vsam is needed, he added.

The currently available release of IV\$AM for OS users supports dynamic loading of the utility when it is needed. A dynamic load option for DOS users is expected to be ready later this month.

The package costs \$5,900 from Dasd at 9045 N. Deerwood Drive, Milwaukee, Wis. 53223.

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## PCS-001 Enhanced

IRVINE, Calif. — Increased user program space and better overall performance are among the enhancements built into Version 2 of the Plessey Commercial Software, an alternative to Digital Equipment Corp.'s CTS-300 commercial operating system, according to a spokesman for Plessey Peripheral Systems, Inc.

PCS-001 produces a multiterminal environment on a small business computer. The package includes DEC's RT-11 with a time-share expansion (TSX) from S & H Computing Leasing Co.; DBL, a Dibol-compatible compiler with an Isam facility; and several utility programs that ease application program development and debugging, he

added.

TSX reportedly provides more efficient record locking, improved multiple message support for DBL programs and an expanded memory (XM) feature that enables memory above 62K bytes to be used as a swap file.

Enhancements made possible with DBL include a smaller and faster runtime, a specialized library of support routines, chains to command files, a more readable Isam status utility and Isam support that can be linked with either the runtime system or the DBL program itself, the spokesman continued.

The package costs \$3,400, Plessey said from 17466 Daimler, Irvine, Calif. 92714.

## 'RMS' Cuts Time Needed By Series/1 Developers

NEW YORK — A vendor here is offering a package it said will "significantly cut" the time needed for system development, testing and debugging, production system maintenance and expansion for users running on IBM's Series/1 minicomputers under the Real-time Programming System (RPS).

The RPS Resource Management System (RMS) is described by Data Structures, Inc. as a totally integrated technique for data storage, retrieval and manipulation with uniform directory utilization. In operation, it "looks like any other RPS file to RPS," a spokesman said.

Within RMS, a buffer management

subsystem shares a single pool for all system needs. Frequently used data is retained in fast memory, and RMS' record management handles access to both sequential and direct files. Insertions and updates are accomplished equally efficiently, the spokesman claimed.

Operating in the RPS shared task set partition, RMS is available to all users and user tasks. It is compatible with all versions of RPS and is used with assembler, Cobol, Fortran or PL/I. During compilation, preprocessors convert all RMS commands to source code with calls to the RMS runtime system, he said.

### Multiple-Volume File Support

Developed in Israel, RMS supports multiple-volume files; a variety of file organizations and multiple indexes for each file. Record lengths can be variable, and file space is allocated dynamically as jobs are run.

RMS can be acquired for \$7,800, with volume discounts available to licensees with multiple Series/1 installations, Data Structures said from Suite 1700, 122 E. 42 St., New York, N.Y. 10017.

## APL Users Get Newsletter

MOUNT CARMEL, Conn. — A periodic newsletter describing the tools, techniques and services available to APL users from a variety of sources has been announced by the Southwater Corp.

Southwater Corp. is a marketing and consulting company serving the APL community.

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# Memory Usage Scheduled Dynamically

## Modcomp Programs Ease Classic Systems Use

FORT LAUDERDALE, Fla. — A pair of programs now being offered by Modular Compute Systems, Inc. should make use of the company's Classic computers easier, according to a spokesman.

A time-sharing executive and transaction processor called TSX developed by S&H Computer Leasing Corp. of Memphis, schedules memory usage dynamically to allow "any number" of interactive users to perform concurrent processing under either Max III or Max IV environments, he said.

A data base management system (DBMS) called Infinity

### 'DYL-260' Gains Support for Use Of Native Vsam

ENCINO, Calif. — Native Vsam support leads the list of enhancements included in Release 5.0 of DYL-260, the report writer/extended utility and data management system from Dylakor Software System, Inc.

The package supports conventional report elements: titles, centering, column headings, control breaks, totals and editing of fields. The utility portion handles file conversions, while the data management controls such things as indexing for arrays and searches and subroutine calls to Cobol and BAL, a spokeswoman said.

With the native mode Vsam support, both key- and entry-sequenced data sets of fixed and variable formats can be accessed and processed in a number of ways. The system supports sequential retrieval from any point in the file, sequential retrieval with update in place and random retrieval with or without update, she reported.

Loading of newly defined Vsam files or reuse of space allocated to files no longer needed is now supported directly the spokeswoman said, adding that alternate index paths are also supported.

The updated DYL-260 costs \$96/mo under a three-year lease plan, she noted from 16255 Ventura Blvd., Encino, Calif. 91436.

supports multiuser access to data base files through the standard operating system's logical I/O structure. It operates as a resident symbiont task, processing queued user requests, the spokesman explained.

Nonresident data base processors are included in the Infinity package for general purpose data entry, retrieval and

file maintenance. Used with Modcomp's Maxnet software, the system can support distributed DP configurations, he added.

TSX supports a "virtual terminal" concept that allows users to work from any available terminal. Even the CRT screen format generator built into TSX recognizes that flexibility: It stores screen images

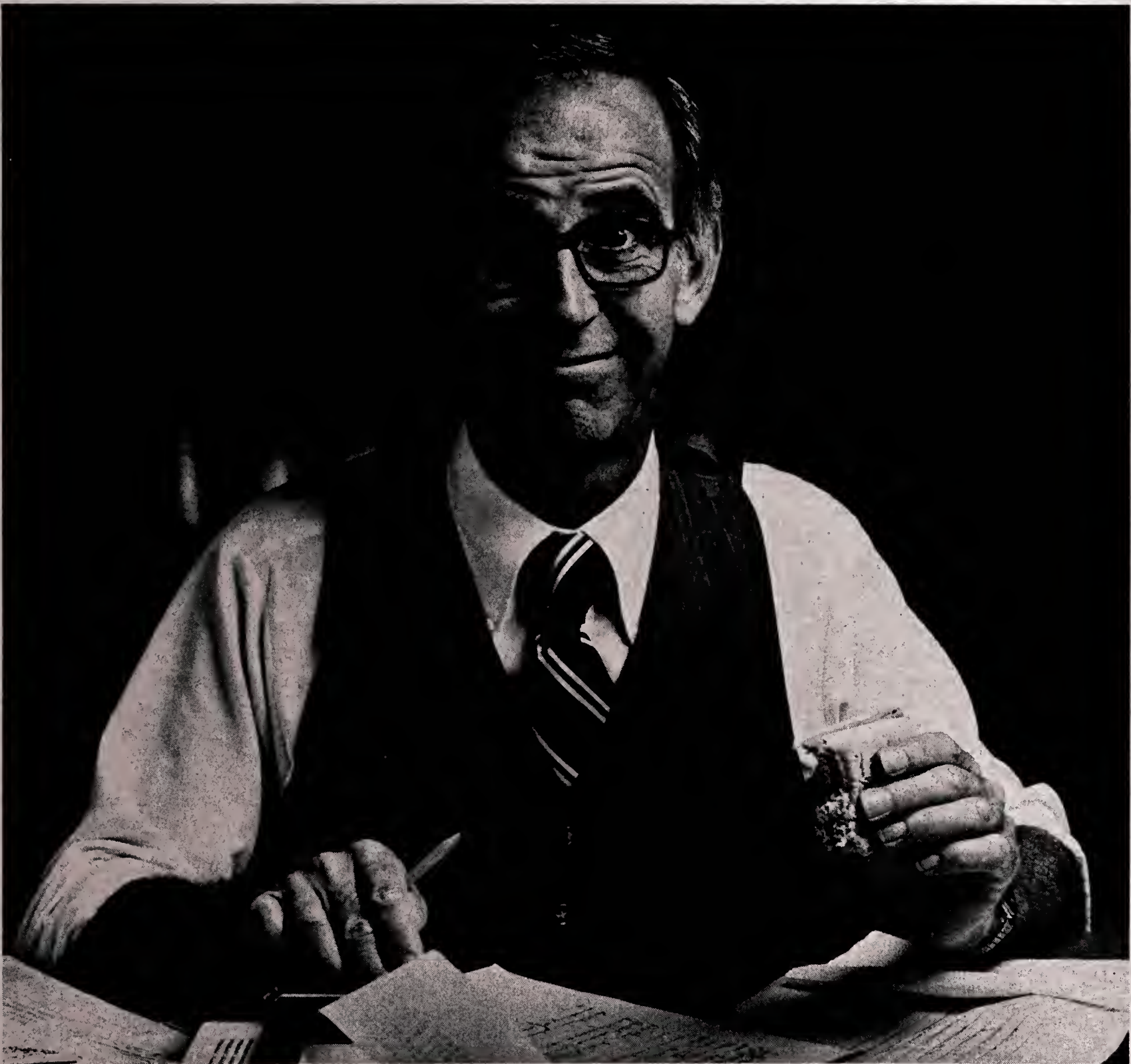
in an intermediate form, which is translated into the appropriate form for the real terminal once it is known.

TSX is said to offer "all the classical timesharing transaction processing features," including password protection, terminal output spooling, accumulation and display of usage statistics and operator control of the system.

Infinity supports classic DBMS facilities, including the separation of data and its management from the using programs.

Scheduled to become available in August, TSX costs \$5,000 while Infinity carries a \$10,000 price tag.

Modcomp can be reached through P.O. Box 6099, Fort Lauderdale, Fla. 33309.



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# T/S Service Predicts Impact of Water Treatments

PITTSBURGH, Pa. — In many U.S. industries, the availability of cool, fresh water is vital. More than 50 trillion gallons of fresh water are needed each year for water cooling processes in such industries as chemical processing, petroleum refining, electric utilities, steel and other basic metal manufacturing.

Chemicals are added to this water as it passes through massive cooling towers to help reduce or prevent problems such as metal corrosion, material deposition or scaling on various cooling elements and pollution of drain-off water. In fact, sound water treatment practices can be critical to a company's productivity.

During the past four years, Calgon

Corp., a subsidiary of Merck & Co., Inc., has focused its entire R&D effort and spent more than \$4 million on the widespread industrial need to predict performance of cooling operations.

Calguard, a cooling analysis and mathematical simulation system, was designed to predict short- and long-range performance of Calgon customers' cooling operations and determine the effects of operating changes, water quality changes and environmental restrictions.

"For example, a customer may tell us 'We have to eliminate this constituent from our plant discharge,' and then ask, 'What can we do, without sacrificing our operation or incurring fines?'" Calgon's market manager W.R. Neil

said recently.

"Management may also ask us, 'What should we use in our cooling system over the next five years in order to invest only X dollars in capital expenditures?' Or 'What must I do to run the same water through the cooling process 15 times instead of five, without detriment to the plant's expected production life?'"

## Installed on Mark III

Calguard has been installed on the General Electric Mark III remote computing service network and is available as a consulting tool to Calgon service representatives throughout the U.S., Canada and Mexico.

Terminals at each Calgon marketing office are used to input data for specific customer plants. Calguard creates a model of each cooling system and stores it. A conversational question-and-answer program elicits information on actual plant operation conditions so that a series of treatment options can be prepared automatically.

Calgon's representatives then use these printed options for presentation to their customers, who can select the treatment most closely suited to their objectives.

"Through Calguard, we can predict in a quantified fashion, with unquestionable precision, the results of actual implementation of a recommended treatment," Neil said.

"And we can offer our customers immediate response to their requests for information when a problem in a given operation occurs," he added. "Since the model is stored on-line on Mark III service, we can — virtually 24 hours a day, seven days a week — solve any problem relating to a specific operation in just a few minutes."

## Consulting Function

"Our field service representatives now have an added dimension to their jobs," Neil continued. "While they have always been technical consultants in water treatment, they now are business consultants to plant management as well."

This added dimension to Calgon representatives' function will undoubtedly generate considerable new business for the corporation. Proposals generated for water treatment via Mark III service — at no extra charge to Calgon customers or prospects — can show a company how to save literally hundreds of thousands of dollars per year.

Shortly after Calguard was introduced in November 1978, one user confirmed that the treatment recommended by Calgon's system saves it \$40,000 to \$50,000 monthly in production costs, not counting the time and money previously needed to clean equipment.

## Quindecillion Interactions

"Until now, there has been no scientific method of analyzing the estimated 'quindecillion' ( $8 \times 10^{17}$ ) potential physical, chemical and operational interactions that affect the performance of an operating cooling water treatment," according to Dr. Richard G. Varsanik, Calgon's senior group leader for cooling water research at the company's headquarters here.

"Traditionally, cooling water treatment has involved too much guess-

work," he said. "The old trial-and-error techniques often required several months to evaluate."

Since cooling systems are dynamic, changes in water quality, operating parameters and environmental conditions can be frequent. The Calguard mathematical models that compute all mechanical/metallurgical and other operating parameters and determine optimum treatment are incredibly complex.

"If a typical Calguard run were done by hand, it might take a full month to come up with a solution," Neil said. "And that's for the routines that could be done that way."

## A Four-Year Effort

Throughout the four-year research effort that produced Calguard, Varsanik and his staff worked closely with General Electric Information Services' technical support staff in Pittsburgh.

System development involved approximately 40 man-years during the course of the project. A modular system design was selected so that various elements of the system could be field tested before Calguard was ready for release.

Calgon's specialists also had to coordinate system design with GE technical people in Rockville, Md., to come up with a solution whereby Calguard's simulation models could access all the available scientific data. After several attempts at linking and overlaying the programs, it was decided that chaining would be the solution. A series of separate programs had to be written to handle the enormous data base.

"Without the Mark III network, it would be impossible to get this service out into the field, and our four years of research would not be as valuable to our customers as it is today," Varsanik noted.

"With Calguard, we have an unparalleled method for applying our technological expertise to our customers' production and business needs," Neil said in conclusion.

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# In Datapro Survey of Users Communications Processors Rated High

By Brad Schultz  
CW Staff

DELRAN, N.J. — Most users of communications processors are more satisfied with the reliability and throughput of their machines than with the maintenance, software and technical support they receive, according to a recent study by Datapro Research Corp.

A plurality (22%) of the 292 survey re-

spondents identified communications processor software as the aspect of remote DP that has caused them the most difficulty. But 18% of the users gave communications lines that distinction; others picked system expansion (14%), host system software (13%), modems (11%) and terminals (10%).

Users are happiest with the reliability of their communications hardware, Datapro found. Asked to rate their experience with

specific brands of hard-wired controllers and front-end processors (see charts on Page 30), they gave reliability an average score of 3.5 out of 4 (4 = excellent, 3 = good, 2 = fair and 1 = poor).

Promptness of maintenance and throughput garnered average ratings of 3.3, although 4% of the respondents said throughput bothered them the most.

## Negative Ratings

On the negative side, average scores for technical support and software were less than 3; only Perkin-Elmer Corp. and Control Data Corp. won acclaim in the former, least acclaimed category.

All things considered, however, the users Datapro polled seemed quite satisfied with their suppliers of communications processors. In the category of overall satisfaction, several vendors won average ratings of close to 4.

The most esteemed are Burroughs Corp. (3.8 on both its DCP processor and on all its other front-end systems); Memorex Corp. (3.7 on its 1270 controller); and NCR Corp.'s Comten Division (3.6 and 3.5 on its 3670 and 3650 front-end processors, respectively). Comtem users represented 22% of the survey respondents.

The survey form was published in the November 1978 supplements to *Datapro 70* and *Datapro Reports on Data Communications*. By mid-January, 292 replies were re-

(Continued on Page 30)

## TI Extends Omni Terminal Line, Offers Silent 700 Validation

HOUSTON — Texas Instruments, Inc. has added three units to its Omni 800 terminal line and is offering a data entry validation option for its Silent 700 models 763 and 765.

The Omni 820 receive-only (RO) printer offers 150 char./sec bidirectional printing and transmission rates from 110- to 9,600 bit/sec. A 9 by 7 dot matrix character font produces an original and up to five copies; a 132-column adjustable carriage handles ticket forms, invoices and purchase orders.

A 1,280-character buffer provides data overflow protection, making the 820 RO useful for demand printing when interfaced with a CRT terminal, TI said.

With a full Ascii character set, the \$1,995 820 RO is available with compressed printing, international voltages and other character sets. A front-panel operator control keypad and terminal status control panel with three-digit LED display are standard.

TI's 825 keyboard send receive (KSR) and RO models were designed for users who favor the lower installation price of bidirectional 75 char./sec machines over faster print speeds, TI said. They can be upgraded to print at 150 char./sec.

The 825 terminals use a 9 by 7 dot matrix character font and print the full Ascii character set on an original and three copies.

Operating at speeds of 110- to 600 bit/sec, the 825 KSR and RO communicate serial asynchronous data, utilizing a 256-character buffer for data overflow protection. The 825 comes with a full Ascii keyboard; an Ascii/APL keyboard is optional.

The 825 KSR costs \$1,695, while the 825 RO is priced at \$1,595. Delivery on the three models is scheduled to begin in October.

## Validation Option

The data entry validation option for the TI 763 and 765 bubble memory terminals is said to improve the operator's input by reducing errors through simplified operation and training and perform a range of arith-

metic and branching functions.

The option provides a user-programmed verification system that poses questions to lead the operator through the data entry process. Data is confirmed by field-checking for character type, field size and field range.

The option also performs table hookups and conditional branching for program flow control, TI said.

The option becomes effective when the terminal's bubble memory is programmed by a TI program development system. The option also allows applications programs to be downloaded either by the program development system or from the host computer.

The data validation option costs \$495. TI is at 9777 West Gulfbank Drive, Houston, Texas 77001.

## Harris 1600 DDP System Gains IBM 3741, 5230 Emulation

DALLAS — Harris Corp.'s Data Communications Division has added IBM 3741 and 5230 batch communications emulators for users of its Model 1600 distributed data processing (DDP) System.

Configured with the 3741 emulator, a Harris 1600 can reportedly emulate both a host computer receiving 3741-formatted data files and an IBM 3741 data entry transmission device such as the Model 2 data station or the Model 4 programmable workstation.

The 1600 emulates the host computer, serving as a preprocessor or concentrator by spooling data files to disk from an IBM 3740 data entry system at speeds of 2,000- or 2,400 bit/sec. After processing the files, the data can be transmitted to a host computer at speeds up to 19K bit/sec, reducing line costs and mainframe use, Harris said.

When the emulator is used with Harris's Format/41 key-to-disk data entry package,

an IBM user with key-to-diskette applications can "virtually" replace the 3740 system with a Harris 1600 DDP system, the vendor claimed.

The 5230 emulator enables the Harris 1600 to emulate IBM's 5231 controller, allowing the 1600 to be used for data collection in factory operations. Serving as a concentrator for an IBM 5230, the 1600 can receive from a 5231 controller data previously collected from 5234 or 5235 shop-floor collection devices.

Through user-written Harris Regal or Cobol programs, the 1600 can produce detailed reports on-site and transmit them or summarized versions to the host computer, Harris said.

There is no charge for either of these emulators, nor is there a charge for retrofitting them to existing 1600 systems, a spokesman said. Harris is located at 16001 Dallas Parkway, Dallas, Texas 75240.

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Diablo 1620/1641/1650/1640  
Teletype Model 43

# Users Rate Communications Processors High

(Continued from Page 29)  
ceived, representing 350 communications processors and controllers and some 17,000 lines connecting about 65,000 remote terminals, Datapro said.  
The results are published in the firm's "All About Communications Processors," a report available for \$12.

Datapro asked the users to indicate how their processors are being used by checking one or more applications in a list of five. Some users indicated they employ multiple units in different fashions; with this qualification, 57% checked emulation of IBM's 270X sys-

tems and 37% registered their environment as simply front-end processing.

A tiny minority picked other applications: 6% called their systems remote concentrators, while 3% checked message switching and 3% indicated some other kind of application.

### Certain Patterns

Datapro found certain patterns suggested by users of IBM 3704 and 3705 processors. Some 90% said their usage is exclusively 270X emulation, the firm reported. And only 10% said their 3704s operate in a partitioned mode,

performing both network control and 270X emulation functions.

Yet about 40% of the 3705 respondents said their units perform either as network-controlling front ends or as both front ends and 270X emulators. In a similar study made a

year earlier, Datapro found just 4% of 3705 users engaged in this manner.

"While it is apparent that many users are still not making use of the full power of front-end processors, it would appear that this percentage is dwindling," Datapro con-

cluded.

With a directory of currently available communications processors and advice on how to buy them, "All About Communications Processors" can be obtained from Datapro at 1805 Underwood Blvd., Delran, N.J. 08075.

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| USERS' RATINGS OF COMMUNICATIONS PROCESSORS/CONTROLLERS |                          |                           |                               |                                   |                      |     |    |    |   |                      |    |     |    |    |            |    |     |    |   |
|---------------------------------------------------------|--------------------------|---------------------------|-------------------------------|-----------------------------------|----------------------|-----|----|----|---|----------------------|----|-----|----|----|------------|----|-----|----|---|
| Processor/Controller                                    | Number of User Responses | Number of Units Installed | Average No. of Lines per Unit | Average No. of Terminals per Line | User Ratings         |     |    |    |   |                      |    |     |    |    |            |    |     |    |   |
|                                                         |                          |                           |                               |                                   | Overall Satisfaction |     |    |    |   | Ease of Installation |    |     |    |    | Throughput |    |     |    |   |
|                                                         |                          |                           |                               |                                   | WA                   | E   | G  | F  | P | WA                   | E  | G   | F  | P  | WA         | E  | G   | F  | P |
| <b>Hard-Wired Controllers</b>                           |                          |                           |                               |                                   |                      |     |    |    |   |                      |    |     |    |    |            |    |     |    |   |
| IBM 270X                                                | 11                       | 13                        | 13.0                          | 1.5                               | 3.5                  | 6   | 5  | 0  | 0 | 3.3                  | 3  | 8   | 0  | 0  | 3.5        | 5  | 6   | 0  | 0 |
| IBM ICA                                                 | 3                        | 3                         | 3.0                           | 5.8                               | 3.3                  | 2   | 0  | 1  | 0 | 3.3                  | 2  | 0   | 1  | 0  | 3.0        | 1  | 1   | 1  | 0 |
| Memorex 1270                                            | 40                       | 61                        | 37.0                          | 3.6                               | 3.7                  | 28  | 11 | 1  | 0 | 3.5                  | 23 | 14  | 2  | 0  | 3.6        | 24 | 15  | 0  | 0 |
| Sperry Univac                                           | 3                        | 3                         | 9.3                           | 3.0                               | 3.3                  | 1   | 2  | 0  | 0 | 3.7                  | 2  | 1   | 0  | 0  | 3.0        | 1  | 1   | 1  | 0 |
| TOTALS                                                  | 57                       | 80                        | 29.2                          | 3.6                               | 3.6                  | 37  | 18 | 2  | 0 | 3.5                  | 30 | 23  | 3  | 0  | 3.5        | 31 | 23  | 2  | 0 |
| <b>Front-End Processors</b>                             |                          |                           |                               |                                   |                      |     |    |    |   |                      |    |     |    |    |            |    |     |    |   |
| Burroughs OCP                                           | 8                        | 10                        | 21.3                          | 3.9                               | 3.8                  | 6   | 2  | 0  | 0 | 3.5                  | 6  | 0   | 2  | 0  | 3.4        | 3  | 5   | 0  | 0 |
| Burroughs, Others                                       | 4                        | 10                        | 15.6                          | 3.0                               | 3.8                  | 3   | 1  | 0  | 0 | 2.8                  | 1  | 1   | 2  | 0  | 3.5        | 2  | 2   | 0  | 0 |
| CCI, CC-80                                              | 3                        | 10                        | 82.8                          | 2.1                               | 3.3                  | 1   | 2  | 0  | 0 | 3.0                  | 1  | 1   | 1  | 0  | 3.7        | 2  | 1   | 0  | 0 |
| Comten 3650                                             | 36                       | 69                        | 75.0                          | 2.5                               | 3.5                  | 22  | 10 | 3  | 0 | 2.9                  | 9  | 17  | 4  | 4  | 3.5        | 18 | 15  | 2  | 0 |
| Comten 3670                                             | 16                       | 32                        | 148.5                         | 3.3                               | 3.6                  | 9   | 7  | 0  | 0 | 3.2                  | 4  | 11  | 1  | 0  | 3.5        | 8  | 8   | 0  | 0 |
| CDC, all                                                | 4                        | 4                         | 40.3                          | 3.5                               | 3.3                  | 2   | 1  | 1  | 0 | 2.5                  | 2  | 0   | 0  | 2  | 3.5        | 2  | 2   | 0  | 0 |
| OEC, all                                                | 3                        | 4                         | 36.0                          | 1.5                               | 3.0                  | 0   | 3  | 0  | 0 | 3.3                  | 1  | 2   | 0  | 0  | 3.3        | 1  | 2   | 0  | 0 |
| Honeywell ON 355                                        | 5                        | 5                         | 21.8                          | 2.3                               | 3.4                  | 3   | 1  | 1  | 0 | 3.0                  | 1  | 2   | 1  | 0  | 3.0        | 1  | 2   | 1  | 0 |
| Honeywell 66XX                                          | 6                        | 12                        | 25.3                          | 2.1                               | 3.2                  | 2   | 3  | 1  | 0 | 3.3                  | 3  | 2   | 1  | 0  | 3.0        | 2  | 2   | 2  | 0 |
| IBM 3704                                                | 40                       | 44                        | 6.1                           | 6.9                               | 3.5                  | 21  | 18 | 1  | 0 | 3.3                  | 16 | 20  | 4  | 0  | 3.4        | 18 | 19  | 2  | 0 |
| IBM 3705                                                | 87                       | 118                       | 34.7                          | 6.0                               | 3.4                  | 41  | 37 | 5  | 0 | 3.0                  | 23 | 46  | 10 | 5  | 3.3        | 31 | 48  | 6  | 0 |
| Memorex 1380                                            | 3                        | 3                         | 30.0                          | 1.7                               | 2.7                  | 0   | 2  | 1  | 0 | 2.7                  | 0  | 2   | 1  | 0  | 3.7        | 2  | 1   | 0  | 0 |
| Perkin-Elmer, all                                       | 3                        | 6                         | 33.5                          | 6.4                               | 3.3                  | 1   | 2  | 0  | 0 | 3.0                  | 0  | 3   | 0  | 0  | 4.0        | 3  | 0   | 0  | 0 |
| Sperry Univac, all                                      | 3                        | 5                         | 10.4                          | 12.8                              | 2.3                  | 0   | 2  | 0  | 1 | 1.7                  | 0  | 0   | 2  | 1  | 2.7        | 0  | 2   | 1  | 0 |
| Others                                                  | 14                       | 18                        | 21.9                          | 6.8                               | 2.8                  | 2   | 6  | 5  | 0 | 2.6                  | 2  | 6   | 5  | 1  | 3.0        | 4  | 5   | 4  | 0 |
| TOTALS                                                  | 235                      | 350                       | 48.4                          | 3.8                               | 3.4                  | 113 | 97 | 18 | 1 | 3.0                  | 69 | 113 | 34 | 13 | 3.3        | 97 | 114 | 18 | 0 |

| USERS' RATINGS OF COMMUNICATIONS PROCESSORS/CONTROLLERS (Continued) |                      |     |    |    |   |                           |    |     |    |   |                        |    |     |    |   |          |    |     |    |    |                   |    |     |    |    |
|---------------------------------------------------------------------|----------------------|-----|----|----|---|---------------------------|----|-----|----|---|------------------------|----|-----|----|---|----------|----|-----|----|----|-------------------|----|-----|----|----|
| Processor/Controller                                                | User Ratings         |     |    |    |   |                           |    |     |    |   |                        |    |     |    |   |          |    |     |    |    |                   |    |     |    |    |
|                                                                     | Hardware Reliability |     |    |    |   | Promptness of Maintenance |    |     |    |   | Quality of Maintenance |    |     |    |   | Software |    |     |    |    | Technical Support |    |     |    |    |
|                                                                     | WA                   | E   | G  | F  | P | WA                        | E  | G   | F  | P | WA                     | E  | G   | F  | P | WA       | E  | G   | F  | P  | WA                | E  | G   | F  | P  |
| Hard-Wired Controllers                                              |                      |     |    |    |   |                           |    |     |    |   |                        |    |     |    |   |          |    |     |    |    |                   |    |     |    |    |
| IBM 270X                                                            | 3.8                  | 9   | 2  | 0  | 0 | 3.5                       | 6  | 3   | 1  | 0 | 3.6                    | 6  | 4   | 0  | 0 | 2.2      | 0  | 5   | 1  | 3  | 2.7               | 1  | 5   | 4  | 0  |
| IBM ICA                                                             | 3.3                  | 2   | 0  | 1  | 0 | 3.7                       | 2  | 1   | 0  | 0 | 3.3                    | 1  | 2   | 0  | 0 | 2.7      | 0  | 2   | 1  | 0  | 3.0               | 1  | 1   | 1  | 0  |
| Memorex 1270                                                        | 3.8                  | 24  | 15 | 0  | 0 | 3.3                       | 17 | 17  | 2  | 2 | 3.2                    | 16 | 16  | 5  | 2 | 2.9      | 2  | 3   | 1  | 1  | 2.7               | 5  | 14  | 10 | 3  |
| Sperry Univac                                                       | 3.5                  | 1   | 1  | 0  | 0 | 4.0                       | 3  | 0   | 0  | 0 | 3.7                    | 2  | 1   | 0  | 0 | 3.5      | 1  | 1   | 0  | 0  | 3.3               | 1  | 2   | 0  | 0  |
| TOTALS                                                              | 3.7                  | 42  | 13 | 1  | 0 | 3.4                       | 28 | 21  | 3  | 2 | 3.3                    | 25 | 23  | 5  | 2 | 2.6      | 3  | 11  | 3  | 4  | 2.7               | 8  | 22  | 15 | 3  |
| Front-End Processors                                                |                      |     |    |    |   |                           |    |     |    |   |                        |    |     |    |   |          |    |     |    |    |                   |    |     |    |    |
| Burroughs DCP                                                       | 3.4                  | 4   | 3  | 1  | 0 | 3.1                       | 2  | 5   | 1  | 0 | 3.1                    | 2  | 5   | 1  | 0 | 3.6      | 4  | 3   | 0  | 0  | 2.8               | 1  | 4   | 3  | 0  |
| Burroughs, others                                                   | 4.0                  | 4   | 0  | 0  | 0 | 3.0                       | 2  | 1   | 0  | 1 | 2.8                    | 1  | 2   | 0  | 1 | 3.3      | 1  | 3   | 0  | 0  | 2.3               | 0  | 2   | 1  | 1  |
| CCI, CC-80                                                          | 3.7                  | 2   | 1  | 0  | 0 | 2.7                       | 0  | 2   | 1  | 0 | 3.0                    | 1  | 1   | 1  | 0 | 2.7      | 1  | 0   | 2  | 0  | 2.7               | 0  | 2   | 1  | 0  |
| Comten 3650                                                         | 3.6                  | 23  | 10 | 2  | 0 | 3.5                       | 18 | 15  | 2  | 0 | 3.3                    | 17 | 12  | 6  | 0 | 3.0      | 11 | 15  | 7  | 2  | 3.0               | 14 | 9   | 6  | 4  |
| Comten 3670                                                         | 3.6                  | 11  | 4  | 1  | 0 | 3.2                       | 5  | 9   | 2  | 0 | 2.9                    | 4  | 7   | 5  | 0 | 3.1      | 4  | 10  | 2  | 0  | 2.8               | 3  | 7   | 4  | 1  |
| CDC, all                                                            | 2.8                  | 2   | 0  | 1  | 1 | 3.5                       | 2  | 2   | 0  | 0 | 3.3                    | 2  | 1   | 1  | 0 | 2.8      | 1  | 2   | 0  | 1  | 3.3               | 3  | 0   | 0  | 1  |
| OEC, all                                                            | 2.7                  | 0   | 2  | 1  | 0 | 2.7                       | 0  | 2   | 1  | 0 | 2.7                    | 0  | 2   | 1  | 0 | 3.0      | 0  | 1   | 0  | 0  | 2.5               | 0  | 1   | 1  | 0  |
| Honeywell ON 355                                                    | 3.4                  | 3   | 1  | 1  | 0 | 3.2                       | 3  | 1   | 0  | 1 | 3.0                    | 2  | 2   | 0  | 1 | 3.0      | 1  | 3   | 1  | 0  | 2.4               | 1  | 1   | 2  | 1  |
| Honeywell 66XX                                                      | 3.6                  | 4   | 2  | 0  | 0 | 3.3                       | 2  | 4   | 0  | 0 | 3.3                    | 2  | 4   | 0  | 0 | 2.8      | 1  | 3   | 0  | 1  | 3.0               | 1  | 4   | 1  | 0  |
| IBM 3704                                                            | 3.7                  | 29  | 10 | 1  | 0 | 3.4                       | 17 | 21  | 2  | 1 | 3.4                    | 18 | 19  | 2  | 0 | 2.9      | 8  | 22  | 7  | 3  | 2.8               | 8  | 17  | 13 | 2  |
| IBM 3705                                                            | 3.7                  | 58  | 25 | 2  | 0 | 3.4                       | 40 | 38  | 5  | 0 | 3.3                    | 36 | 39  | 8  | 1 | 2.9      | 15 | 48  | 19 | 3  | 3.0               | 15 | 50  | 18 | 0  |
| Memorex 1380                                                        | 3.0                  | 0   | 3  | 0  | 0 | 3.3                       | 1  | 2   | 0  | 0 | 3.0                    | 0  | 3   | 0  | 0 | 1.5      | 0  | 0   | 1  | 1  | 1.5               | 0  | 0   | 1  | 1  |
| Perkin-Elmer, all                                                   | 3.7                  | 2   | 1  | 0  | 0 | 3.0                       | 0  | 2   | 0  | 0 | 3.0                    | 0  | 2   | 0  | 0 | 2.0      | 0  | 0   | 2  | 0  | 3.5               | 1  | 1   | 0  | 0  |
| Sperry Univac, all                                                  | 2.3                  | 0   | 2  | 0  | 1 | 2.7                       | 1  | 1   | 0  | 1 | 2.7                    | 0  | 2   | 1  | 0 | 1.3      | 0  | 0   | 1  | 2  | 1.7               | 0  | 1   | 0  | 2  |
| Others                                                              | 2.8                  | 3   | 5  | 5  | 0 | 2.4                       | 3  | 3   | 3  | 4 | 2.8                    | 3  | 4   | 6  | 0 | 2.3      | 0  | 4   | 5  | 1  | 2.2               | 0  | 4   | 5  | 2  |
| TOTALS                                                              | 3.5                  | 145 | 69 | 15 | 2 | 3.3                       | 96 | 108 | 17 | 8 | 3.2                    | 88 | 105 | 32 | 3 | 2.9      | 47 | 114 | 47 | 14 | 2.8               | 47 | 103 | 56 | 15 |

Datapro Research Corp. Charts

In the above charts, user ratings report the number of users responding excellent (E), good (G), fair (F) and poor (P). The weighted averages (WA) were calculated on the four-point scale.

## Fiber Optics Set As Seminar Topic

BROOKLINE, Mass. — A 13-city seminar series entitled "Fiber Optics: Technology and Marketing" will be given in August through December by the Communications and Information Institute.

The two-day courses are slated for Boston, Chicago, Minneapolis, Atlanta, Phoenix, Kansas City, Dallas, Seattle, New Orleans, Washington, D.C., Philadelphia, San Francisco and San Diego.

The first day's technical seminar costs \$195, while the marketing seminar on the following day costs \$245.

Registration for both days costs \$395, according to Donna S. Ahrend, director of the institute at 167 Corey Road, Brookline, Mass. 02146.

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# Cuts Overhead, Improves Service

## Service Bureau Turns to Terminal Lessor for Help

By Jay Woodruff  
CW Staff

BALTIMORE — A real estate multiple listing organization serving the greater Baltimore area has reduced overhead and bettered its service to subscribers by making a service company responsible for the DP equipment they use.

Half the subscribers to the Central Maryland Multiple Listing Service (CMMLS) use terminals for rapid acquisition of data, and more of them are said to be converting to terminals each month. CMMLS previously bought the terminals and leased them to subscribers, but found that administering the program was time-consuming and inefficient.

The service, which serves a four-county area around Baltimore, gathers information from local real estate brokers and compiles it into a list that is made available to the subscribers. Formerly, CMMLS obtained terminals from a vendor based on its best guess of how many of the subscribers would order them. Sometimes it guessed right — and sometimes it didn't.

"If we ordered 10 but only got five orders, we were all right; if we got 15 orders, we had to wait until the next month to fill five of them," the firm's Frank Tuma said.

CMMLS now uses Leasametric, a part of Trans Union Leasing Corp. of Foster City, Calif., to lease terminals directly to the subscribers at the same rate it cost through CMMLS. How has it worked? "We give our customer membership better service and I can devote more time to other things," Tuma said.

CMMLS is one of the few multiple listing real estate service companies in the U.S. with its own mainframe, an NCR Corp. Century 151 with a 256K-byte memory and four Model 657 disks, each with 296.8M bytes of storage.

The 250 terminals communicate with the CPU over dial-up lines that connect on-line to a multiplexer which can handle 30 incoming lines.

### Sample Newsletter Free From Datapro

DELRAN, N.J. — Datapro Research Corp. is offering a free copy of its latest monthly newsletter, "Communications Management News Briefs," to managers, network designers, systems planners, users and vendors.

The publication focuses on new products and industry developments.

A one-year subscription to the newsletter costs \$42, Datapro said from 1805 Underwood Blvd., Delran, N.J. 08075.

Letting Leasametric handle terminal leasing to the real estate brokers took away a big operational headache, Tuma said.

"Previously we handled terminal service contracts. We got involved right down the line. If one broke, for example, we had to determine which ones had service contracts and which were still covered under the manufacturer's 90-day warranty," he recalled.

Although Texas Instruments, Inc., the main supplier of CMMLS's terminals (models 743 and 745), responded to service calls within 24 hours, the user was forced to wait if the service person did not have the necessary part. Leasametric, on the other hand, re-

places a troubled terminal with a functional model on the spot, virtually guaranteeing that the user never goes more than a day without a machine, Tuma explained.

Letting Leasametric take care of the terminals has allowed CMMLS to spend more time on the business of providing multiple listings and additional services to its subscribers. The company boasts its own programming and data entry staffs and has reportedly put together an array of programs that require minimal user expertise.

CMMLS agents can order a complete printout of real estate listings and assemble financial plans for prospective buyers, adjusting plans so the system

can generate a suitable financing package.

The system helps the agent to meet a requirement of the customer's financing bank for a full accounting of the costs of buying a residence. The agent is spared the ordeal of filling out a settlement sheet for the bank; instead, he can order the computer to print it out on the terminal.

Better service on the terminals and work-saving software has reportedly put CMMLS in a better position to serve its subscribers. Agents can project a greater aura of professionalism by using the computer to rapidly present accurate figures to prospective buyers, Tuma added.

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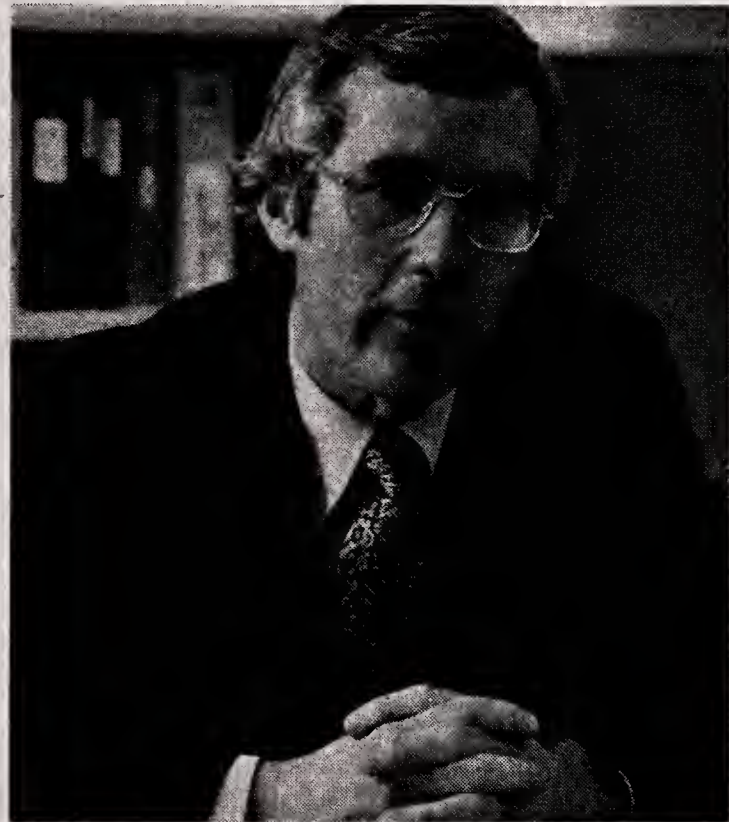
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# Communications Processor Out

DEL MAR, Calif. — A data communications processor for use between distributed processors and remote Control Data Corp. equipment is available from Pacifica Technology under the Pactech label.

Pacifica's Model CB communications processor emulates a Pacifica Model 200 user's terminal via the Mode 4A protocol to allow synchronous communications from a remote processor to a host CPU through phone lines. An asynchronous protocol is provided to enable the user to interface his in-house computer system

or computer-controlled devices, Pacifica added.

The CB employs a Z80 microprocessor to drive two independent serial communications channels at rates up to 9,600 bit/sec, the vendor said. One of these channels reportedly functions synchronously at up to 4,800 bit/sec for links with a remote CDC site over phone lines and through modems.

The CB accepts one card or keyboard image at a time and delivers a single printed line or displayed line on demand, Pacifica continued. The processor costs \$5,000, with

OEM discounts available, from the vendor at P.O. Box 148, Del Mar, Calif. 92014.

## Necis Adds Five Devices For Printers

LEXINGTON, Mass. — Five forms-handling devices that are said to more than double the paper-handling capabilities of NEC Information Systems, Inc. (Necis) Spinwriter printers were recently introduced.

They are a cartridge-type cut-sheet feeder that feeds from two bins, a lightweight cut-sheet feeder, a horizontal forms feeder, a bidirectional forms tractor and a front inserter.

Able to run unattended, the two-bin feeder has a cartridge capacity of 200 20-lb sheets. It costs \$2,000.

The microprocessor-controlled, single-bin, cut-sheet feeder provides automatic insertion and stacking of up to 200 forms, Necis said. The 8.5-lb unit costs \$1,200.

### Forms Tractor

Necis' \$140 horizontal forms tractor can reportedly be used where many different sizes of continuous forms are required. The bidirectional forms tractor was designed for continuous forms applications where reverse paper motion is required. It costs \$320.

And the Necis front inserter is intended for demand document applications where single-cut forms, bottom-glued forms and ledger cards are used. It sells for \$1,410.

Necis is located at 5 Militia Drive, Lexington, Mass. 02173.

## Starplex Gains Link With Intels

SANTA CLARA, Calif. — National Semiconductor Corp. has introduced a communications link for use between its Starplex development system and Intel Corp.'s development systems, models 220, 230, 800 and 888.

Called Starlink, the line lets users transfer files between the two systems. It consists of a 50-ft cable connecting the RS-232C serial ports of the two systems and supporting software.

Starlink costs \$250. Because Intel's 800 and 888 systems lack a spare serial RS-232C port, they also require a BLC-517 communications board and cable assembly to accommodate the link, National Semi said from 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

## Megatek's Whizzards Get More Software

SAN DIEGO, Calif. — Megatek Corp.'s Wizzard 5000 and 7000 series of vector refresh graphics terminals and systems can now be put on-line with a set of interactive software applications packages available from the vendor.

The software, known as Wand 1, allows the user "to quickly transform ideas into images," the company said. Wand 1 can also be executed in a special interactive mode to let the user access all program functions without writing a single line of code, it claimed.

Shapes like circles, regular polygons and plots can be generated using Wand 1.

A curve-fitting function is also provided that allows a curve to be manipulated after it is drawn. Since data points can be entered interactively through a joystick or data tablet, changes to the shape can be monitored in real time.

Wand is said to be fully compatible with Megatek's MGS-5000 and MGS-7000 Fortran-callable routines and its statements can be intermixed in any order with Fortran or MGS statements. The software can be driven either by a user-written program or by on-line interaction.

The software can be moved from one installation to another to eliminate reprogramming expenses. It can also run under many Data General Corp. and Digital Equipment Corp. operating systems, Megatek claimed.

Wand 1 software costs \$495 from Megatek Corp., 3931 Sorrento Valley Blvd., San Diego, Calif. 92121.

## Fiber Optics Exposition Slated for Sept. 5-7

CHICAGO — FOC '79, the Second International Fiber Optics and Communications Exposition, will be held here Sept. 5-7 at the Hyatt Regency O'Hare.

The exposition will consist of a technical program, exhibits, demonstrations and short courses on fiber optics.

The technical programs will include discussions on the future of fiber optics, common carrier applications, rural communications and recent developments in couplers, detectors, connectors, splices and fiber cables.

Among the exhibitors will be Belden Corp., Bell Laboratories, Corning Glass Works, Dupont Co., General Cable Corp., General Optronics, Inc., ITT Electro-Optics Prod-

ucts Division, Northern Telecom Canada Ltd., Siecor Optical Cables, Inc. and Valtec Corp.

A two-day advanced course will offer a technical review of the latest developments, while another two-day course is designed to teach attendees the basics of fiber optics system design. A one-day course will explore fiber optics markets and opportunities.

The technical program fees are \$100 for all three days or \$50 for one day. The exhibit alone costs \$15. The two-day short courses will cost \$325 each, while the one-day course costs \$100.

More information is available from Information Gatekeepers, Inc., 167 Corey Road, Brookline, Mass. 02146.

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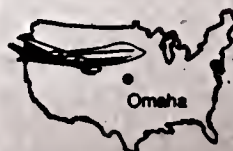
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## CRT Offers Large Print

BOSTON — Arts Associates, Inc. has released its Large Print Video Terminal (LPVT) for the visually impaired as well as those with normal vision.

Said to be suitable for facilities required to meet federal Affirmative Action computer accessibility requirements, the LPVT is a stand-alone, RS-232C-compatible CRT terminal with three user-selectable print sizes up to 1.5 in. high.

Eight interchangeable foreground and background colors offer a variety of contrasts, Arts said. The unit's "window" feature buffers a screenful of data from the host processor, allowing the user to scan it at his own pace.

Selectable transmission rates range from 110- to 9,600 bit/sec, although the maximum speed for large print is 1,200 bit/sec.

With "standard" editing, a 19-in. screen and separate Ascii keyboard with 16-key numeric cluster and 8-key color pad, the LPVT sells for \$9,000.

Arts Associates is at Suite 1260, 80 Boylston St., Boston, Mass. 02116.

## Minifloppy Unit Built for RS-232

COLUMBIA, Md. — Columbia Data Products, Inc.'s Model 400 floppy disk system stores up to 179,200 characters in a single-sided, double-density Shugart Associates, Inc. minidisk drive.

The system was designed to connect between asynchronous RS-232 or teletypewriter terminals and a modem/CPU for store-and-forward applications. Dual universal asynchronous receiver transmitters (Uart) provide buffered on-line transmission rate conversion between interconnected devices of equal or different rates in the 110- to 19.2K bit/sec range, Columbia said.

High-speed operation (19.2K bit/sec) is effected by a dynamic triple block buffering technique that reportedly allows continuous data recording and playback over the complete disk surface without discontinuities between track changes.

Complete software, including a text editor and directory-controlled file management system, resides in read-only memory. The text editor allows user flexibility to insert, delete, search, change, edit and manipulate data, the vendor explained.

The Model 400's file management system provides fast random data access, a spokesman added.

The Model 400 costs \$1,995. Columbia is located at 9050 Red Branch Road; Columbia, Md. 21045.

## Tymnet Service Extended to Alaska, Hawaii

CUPERTINO, Calif. — Tymnet, Inc. has extended its packet network to Alaska and Hawaii.

Alascom, the Alaskan common carrier that provides local and international communications services in the state, recently installed a Tymnet node in Juneau. It will provide toll-free access throughout Alaska to any host computer on Tymnet in the 48 contiguous states.

This marks the first time that a U.S. public packet network can be accessed on a public basis from Alaska, Tymnet claimed.

### Access Charges

Charges for terminal access from Alaska to U.S. host computers via Tymnet will be \$6.50 per connect hour plus 30 cents per thousand characters

transmitted.

The Hawaiian service is provided by Western Union International through a Tymnet node in Honolulu. Terminal users in Hawaii can access U.S. host

computers on Tymnet at charges of \$3 per connect hour plus 20 cents per thousand characters transmitted.

Tymnet, Inc. is based at 20665 Valley Green Drive, Cupertino, Calif. 95014.

## Dual-Speed Modem Bows

CHICAGO — U.S. Robotics, Inc. has unveiled a full-duplex modem that works at 300- and 1,200 bit/sec over voice-grade telephone lines.

Made by Penril Corp., the Penril 300/1200 modem features direct two-wire connection to direct dialing or leased lines.

It has been certified by the Federal Communications Commission, U.S. Robotics said.

The modem's originate operation re-

quires only a standard telephone, the vendor added. It is compatible with the Bell 212A at 1,200 bit/sec and with the Bell 100 series at 300 bit/sec.

Available in a stand-alone or rack-mounted configuration with RS-232 interfacing, the unit weighs 4 lbs. The stand-alone Penril 300/1200 costs \$799; the tag on rack-mounted versions varies with the quantity ordered.

U.S. Robotics is located at 1035 W. Lake St., Chicago, Ill. 60607.

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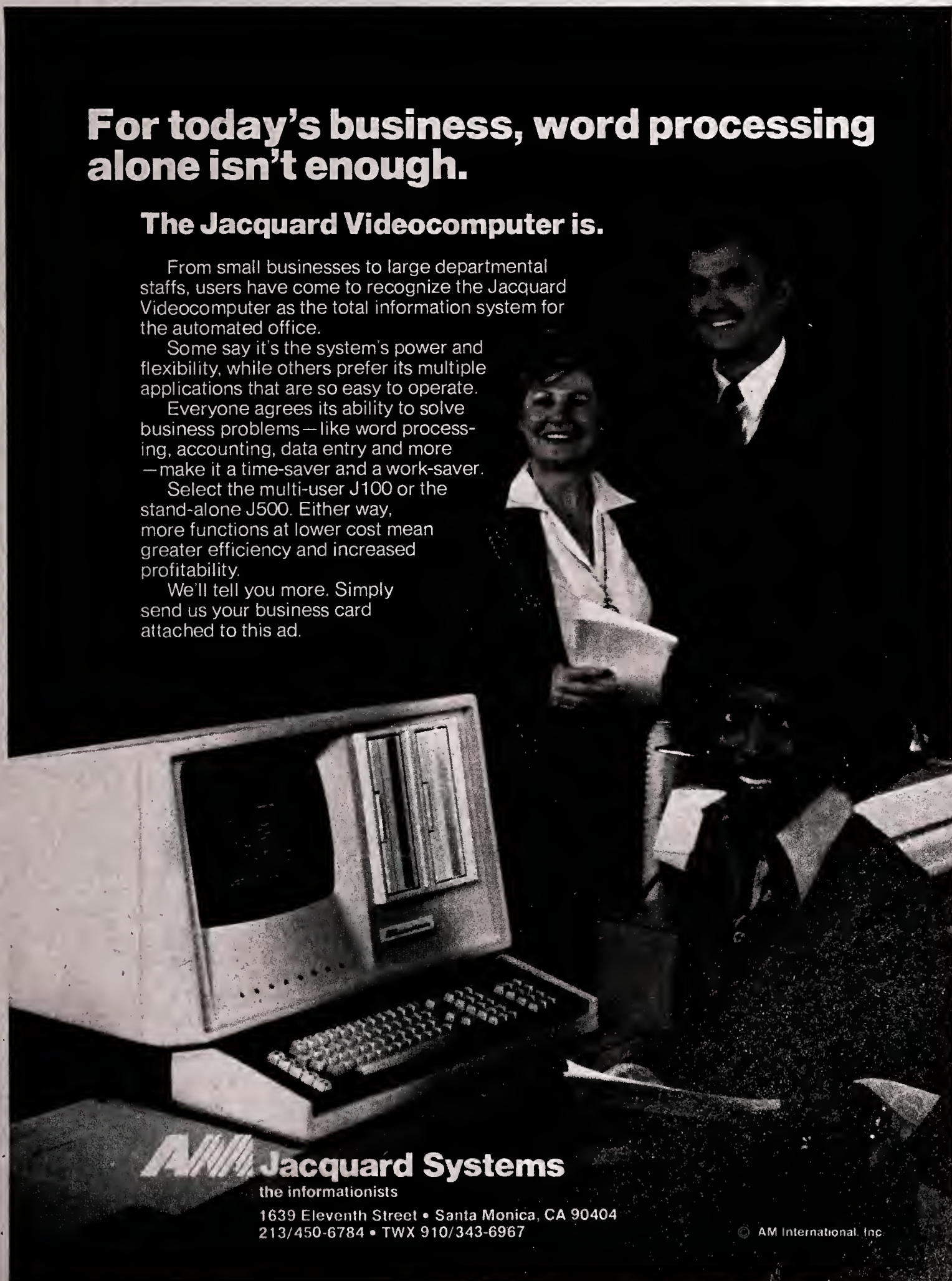
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# Mainframe, Remote Terminals Tied

## User of Fiber-Optic Link Reports Lower Costs

Special to CW  
HOUSTON — The installation of a fiber-optic link between a mainframe and remote CRT terminals has substantially reduced a data communications system's operational costs since it went on-line here last December.

The fiber-optic link replaced conventional telephone transmission methods last year [CW, April 17, 1978], eliminating costly service and equipment charges.

Installed by the City of Houston, the link connects five CRT terminals in the city's new main library to Houston's central management information system (MIS) computer in the Municipal Courts Building. The fiber-optic cable, which uses pulses of light instead of electrical signals, travels approximately 4,900 feet through underground ducts beneath the streets.

The bidirectional system was developed by Univac especially for this application. The fiber-optic cable was supplied by Belden Corp.'s Fiber Optics Group in Geneva, Ill.

"When I was assigned system responsibility two years

ago, remote CRT keyboard terminals were connected to the MIS computer by telephone lines," recalled Alan Albright, Houston's MIS manager. "In the case of the library, the five data entry terminals were used to update book circulation data and other operational information."

This system required five phone lines at a cost of \$54/mo each, plus two modems per line costing \$60, plus a \$15 per line monthly maintenance charge. The total cost was \$129/mo per line, or \$7,740 annually.

### End to Phone Lines

Albright determined that the method offered opportunities for cost reduction if dependence upon conventional telephone techniques could be eliminated. The fact that the city owns numerous underground ducts provided an advantage not available to most private companies.

"In order to bypass telephone company equipment and costs," Albright continued, "we needed to hard-wire the five Univac Computer-Assisted Data Entry [Cade]

terminals into the Univac System 1900 disk file. However, we found that this would be impossible using conventional baseband coaxial cable transmission techniques."

Univac reported to Albright that the maximum transmission distance was about 3,000 feet using thick (almost half-inch diameter) RG-8/U-type coaxial cable. Because the library terminals were 4,900 feet by duct from the computer, electronic cable would not work unless augmented by a costly carrier system.

"I had previously worked with fiber optics, so I asked Univac whether a low-loss fiber-optic link would be feasible between the terminals and the distant computer. Fortunately, the request dovetailed with its development work, and the company agreed to the experiment," Albright said.

### Optical Modems

Late in 1978, Univac supplied the city with two specially developed "optical modems" that convert electrical pulses into light pulses and vice versa. In addition, the company supplied a continuous 5,500-foot length of a single-fiber optical cable manufactured by Belden.

The cable was to be installed by Houston telephone construction crews, and the modems were to be connected by Univac.

According to Barry Hannom, director of Univac's Advanced Technology Laboratory, each optical modem has a high-intensity infrared LED source and an avalanche photo detector separated by a beam splitter.

The system is half-duplex in that information can be sent in only one direction at a time. However, Hannom indicated that a single-fiber, full-duplex system is presently under development.

The optic link can operate at the full bit rate of the computer, which means that the terminals in the library transmit and receive data during the polling time as quickly as if they were hard-wired to the computer by means of coaxial cable.

In addition to relatively long transmissions, the fiber-optic link has many other advantages, Hannom indicated.

"For one, the cable is not sensitive to electromagnetic interference. It can be run in either power or signal cable ducts, and it is completely immune to crosstalk.

"Noise-inducing ground loops, constant headaches for system designers when terminals are located long distances from processors, are eliminated."

But designing and constructing an optic link solved only half of the city's data transmission problem. The other half was pulling a continuous 4,900-foot length of cable through a duct system already crammed with phone cables.

"In my 20 years of installing cables, this was the worst pull I ever encountered," stated Lewis Boehm, city electrician in charge of the cable's installation. "I was certain that the fiber would be broken and our work would be an exercise in futility. I couldn't believe it when we found that the optic strand had survived."

"I estimate that we subjected the cable to 800 to 1,000 pounds of force during installation," he said. Univac tests had previously indicated that Belden's ruggedized construction could withstand 1,000 pounds of tensile stress; the tests also revealed that the cable even could be knotted without breaking the fiber.

The pull took place in two phases during October and late November 1978. The dispensing reel was set up in a vault in the Municipal Courts Building.

From there the cable was pulled from manhole to manhole, initially by hand and later with a butterfly on a winch. A total of 15 manholes had to be opened. The cable was well lubricated with soap wherever possible.

Some 19 men were involved at one time or another in the installation, serving as cable feeders, pullers and radio-outfitted watchers in the holes.

For much of the 4,900-foot

distance, the optic cable was pulled through 3- and 4-inch ducts already filled with a 2-5/8-inch diameter, 300-pair telephone cable installed last August.

### Circuitous Route

The cable route did not take a straight path from the Municipal Courts Building to the library, but followed a circuitous route through available ducts.

At one point, the cable had to drop 30 feet, go under a tunnel and then rise 30 feet back to street level.

Inside the buildings at each end of the link, ducts or conduits were not available. Therefore, the cable was snaked above suspended ceilings to the modems serving the computer and the terminals.

### 'Operating Perfectly'

"The optic link went on-line in early December and has been operating perfectly ever since," Albright said. "Users of the remote terminals in the library have become very fond of the new system because CRT screens are filled and emptied instantaneously, as opposed to the 4- to 6-second lag experienced with previous telephone transmissions."

"Although the system was not selected for this purpose, we are finding the faster transmission rates an added benefit," he said. "Very shortly, we also will begin seeing the cost-savings predicted. The one-time charge for installing the cable will be offset by the \$645 per month phone line savings."

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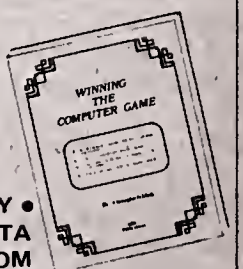
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## Bits & Pieces

### Printers Get Translucent Paper

SANTA CLARA, Calif. — Translucent paper for electrostatic printers and plotters from Versatec, Inc. provides translucence for overlays and UV transmission for blueprint reproduction.

With its greater tensile strength and tear resistance in both axes, the paper is an advance over the company's previous offering in this area, a spokesman claimed.

The paper can be used with Versatec electrostatic printers and plotters in widths up to 36 in., with additional widths to be available soon.

The paper costs approximately .053 cents per square foot, F.O.B. Santa Clara, and free samples are available from the company at 2805 Bowers Ave., Santa Clara, Calif. 95051.

### Dual-Density Tape Offered for Kodak Gear

ROCHESTER, N.Y. — Eastman Kodak Co. has announced a tape drive for its Komstar 200 and 300 microimage processors and its Kom-85 microfilmers that permits users to input either 6,250- or 1,600 bit/in. tapes.

The dual-density tape drive, labeled the Kodak 6250/1600, will be available early next year.

No price has yet been set for the product, the spokesman said from Kodak at 343 State St., Rochester, N.Y. 14650.

### Any Hints?

If you're a cost-conscious DPer who can leap tall budgets in a single bound, how about sharing some of your expertise?

"Stretching the DP Dollar" is the theme of an upcoming *Computerworld* special report. All contributions are welcome; they should be typed, double-spaced and about four or five pages long.

Send them to Howard A. Kerten at CW, 797 Washington St., Newton, Mass. 02160.

## As Shortages Take Their Toll Power Problems Seen Surging

By Brad Schultz  
CW Staff

NEW YORK — Electric power problems disrupt computer operations more extensively than most DP professionals realize, experts agreed at a recent conference here.

Those problems will intensify in the coming years for two reasons. First, hardware becomes more sensitive to fluctuating or subnormal power levels as it becomes more sophisticated. Second, electricity shortages giving rise to fluctuating power levels will become more common.

Users cannot expect much sympathy from the nation's electric utility companies, the panelists observed. Utilities — like many DPs — do not know that power breaks of a few milliseconds set most systems crashing or that inconstant voltages can scramble stored data and induce computational errors. In fact, some utilities only log power breaks lasting more than one minute.

Power fluctuations account for most tape drive failures at the Social Security Administration's (SSA) Baltimore headquarters, according to Mike Abramowitz, who advises the federal agency on managing what is called the world's largest civilian DP facility. Abramowitz blamed the power supply for 40% to 60% of the computer circuit board failures experienced at the 200,000-sq-ft center.

More than one-fifth of the center's floor space is taken up by uninterruptible power systems (UPS) capable of generating 21,000 kW. The UPSs are there to keep a vast arsenal of computer systems alive in the event commercial power fails.

A blackout could freeze the 550 tape drives and 400 disk drives that store the 70 billion characters of data the SSA has linked to some 2,000 separate communications facilities across the nation, Abramowitz pointed out.

Anticipating continued petroleum shortages, the SSA has specified turbine generators for some of the UPSs at a 650,000-sq-ft computer center building under construction nearby. Turbine generators do not require petroleum fuel, Abramowitz explained.

The agency's DP acquisition policy also indicates deep concern about energy. In guiding the process, Abramowitz employs "bid equalization factors" that encourage vendors to offer energy-saving systems.

The basis of this method is a simple equation: 1KVA times 8,760 hours times 5 years equals \$1,182. Translation: every KVA the agency can save with a system represents a savings of \$1,182 in the five years the system will probably serve. The SSA considers these figures carefully when evaluating vendor bids.

### Planning for a UPS

Unlike the SSA, most users cannot justify the purchase of a UPS, which usually costs \$15,000. Installation costs an additional \$5,000, Robert Robbins said. Moreover, the correct procedure for purchasing a UPS is a complicated one.

First, the user should conduct a thorough study of its power needs. Toward this end, Robbins who is president of Randolph Engineering, Inc., a designer of computer facilities, recommended that power monitors record consumption for two or three representative months.

If a UPS seems justified, the user next needs to determine where to install it. Adequate space, proper air conditioning, ventilation for the associated battery room (most UPSs are battery-powered), adequate floor loading capacity, a supply of water for cooling and a drain for the battery room are all mandatory, Robbins stated.

The user should then write out detailed technical performance specifications. Plans must be made for future expansions, Robbins said, and spare parts must be selected. The user should also form a strategy for soliciting and evaluating UPS vendor bids.

Bid evaluation should include the study of such things as cooling and ventilation; acid neutralization in the battery room; the room's resistance to explosions (battery acid generates volatile

*(Continued on Page 36)*

## Datapro Reports Ready On Disk, Tape Drives

DELRAN, N.J. — "All About Plug-Compatible Disk Drives," recently published by Datapro Research Corp., is a 21-page report that includes 11 pages of detailed specifications on virtually all of those devices made today.

Also included in the \$12 report is a brief history of plug-compatible disk drives, a checklist for selecting a drive and a vendor and a brief table showing users' ratings of disk subsystems.

However, the number of users responding to the survey on disk subsystems was small, and the study contains no explanation of how the survey was conducted.

A similar study that deals with plug-compatible tape drives is available separately for \$12. The information in the tape study is similar in form to the disk study.

The studies are compiled and sold by Datapro, 1805 Underwood Blvd, Delran, N.J. 08075.

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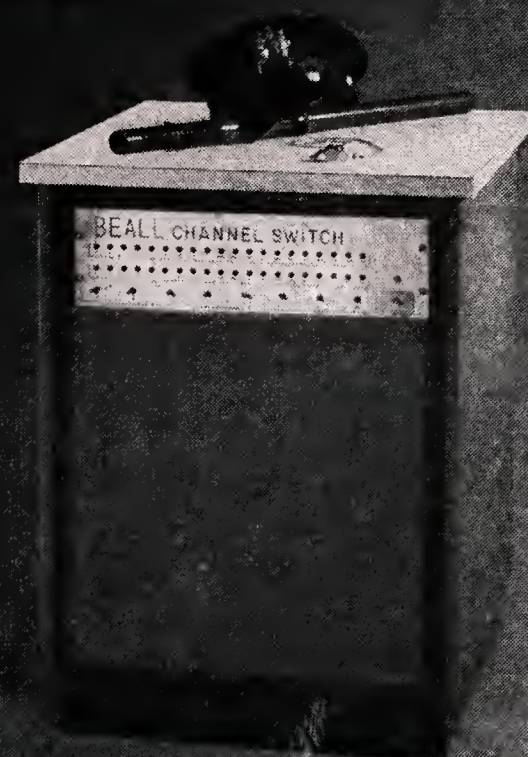
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# Tax Bureau Exempted From Needless Delay

SALEM, Ore. — What do you do when your raw files begin to stretch out to a length as long as six football fields? If you're the Department of Revenue of the State of Oregon, you install a computer to keep track of them.

Before the Pertec Computer Corp. XL40 was installed, department employees spent a great deal of time searching for particular tax returns, causing numerous delays. Now the delays and difficulties are simply not-so-pleasant memories, according to Duane Cunningham, computer services supervisor of the State's tax department.

"It had to happen," he said recently,

explaining, "After state income tax time each year, the file of returns waiting to be audited grows daily as the mainframe processes the returns that are accumulating.

"Those that don't pass the mainframe's mathematical verification are

## Power Problems Seen Rising

(Continued from Page 35)

gases); the room's eyewash and shower (required safety measures); structural modifications; portability of the equipment; and acoustics.

In addition to acquiring the UPS, the user must also hire a firm to design the implementation of associated electrical equipment and cabling, Robbins continued. When planning the electrical design, the user should note the inconvenience of downtime during installation.

Finally, the UPS must be installed. The user must hire and supervise the contractor, formulate start-up procedures, test the equipment for acceptability and train local people to do preventive and first-level remedial maintenance.

While still very expensive, UPS prices have dropped significantly in the past decade. Will the decline continue long enough to make the UPS a viable alternative for smaller users? Ken Brill, president of Atlas Energy Systems, expects this technology to remain expensive during the next several years.

The UPS industry has struggled for many years precisely because few users could afford its products, Brill explained. The shortage of electricity, while driving up the demand for power corrective equipment, will not end the shortage of UPS vendors.

As a result, the vendors, already swamped with orders, will have no incentive to lower prices — an action that will swamp them further, Brill said.

A representative of the UPS industry and the president of Franklin Electric Co.'s Programmed Power division, Lee Cooper, seemed to agree. "We're pretty close to a leveling point in UPS prices, although the situation depends somewhat on the volatile prices of manufacturing materials such as copper, iron and steel," he observed.

Will major computer vendors enter the business? IBM and Amdahl Corp. started to, but abruptly bailed out, Cooper told *Computerworld*. Those companies found they could reap more profits by subcontracting with the established UPS firms.

sent over to us for review or audit. We enter the numbers assigned to those returns in a file we call our 'A' file."

That file, kept on the XL40 system, quickly finds the records in question.

### Combating Personnel Costs

For years, the department had been hiring more and more people to locate and track rejected tax returns as the documents progressed through the review and audit cycles. The new system changed all that almost immediately, Cunningham observed.

"We've reduced the number of people assigned to locating and tracking more than enough to pay for the system," he continued. "Moreover, the auditors can work more effectively, and we respond more rapidly to taxpayers calling in to inquire about the status of their returns. We've improved our entire review and auditing process."

The system also keeps track of unclaimed refund checks, Cunningham noted. "We enter the [appropriate] data on the XL40, and when people call in asking 'Where's my refund check?' we type in the person's name, retrieve the information and the check and mail the check to the person."

Before the system was installed, finding a specific suspended file was almost always an exasperating procedure, he recalled.

Another one of the system's key features is the "B" file, which lists the returns under active auditing. "The B file

starts to build up as staff members request the tax returns listed in the A file, usually for an audit," according to Robert Young, manager of operations for the department.

"But other problems arise. For example, a taxpayer may send in an amended return — perhaps a W-2 was forgotten. Now he wants a little better refund, so we have to find the first return, compare it to the second and figure out what the refund should be.

### Helps Several Ways

"The B file helps us in several ways, but its primary task always is to tell us exactly where the documents are at any time after the return has been pulled from the 'A' file. Later, when returns have completed audit processing, we de-list them from the 'B' file and send them back to general storage," he explained.

Workers in the department accepted the system enthusiastically, after a very minor amount of grumbling from some employees, Cunningham said.

"Keeping careful track of all those returns is essential to an orderly operation," Young said. "With auditors working on numerous returns at one time, waiting for information from taxpayers or for the results of litigation, returns may be in process for 120 to 200 days.

"But now, we're on top of things in a way we never were before," he concluded.

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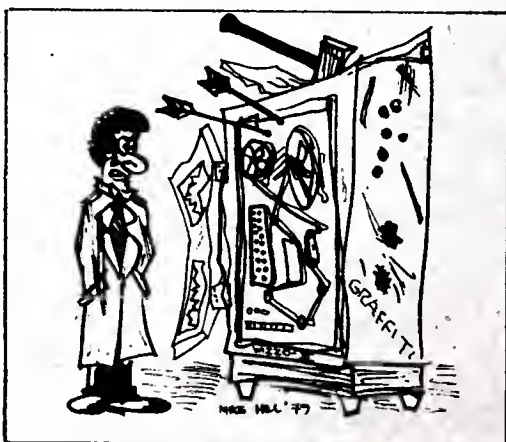
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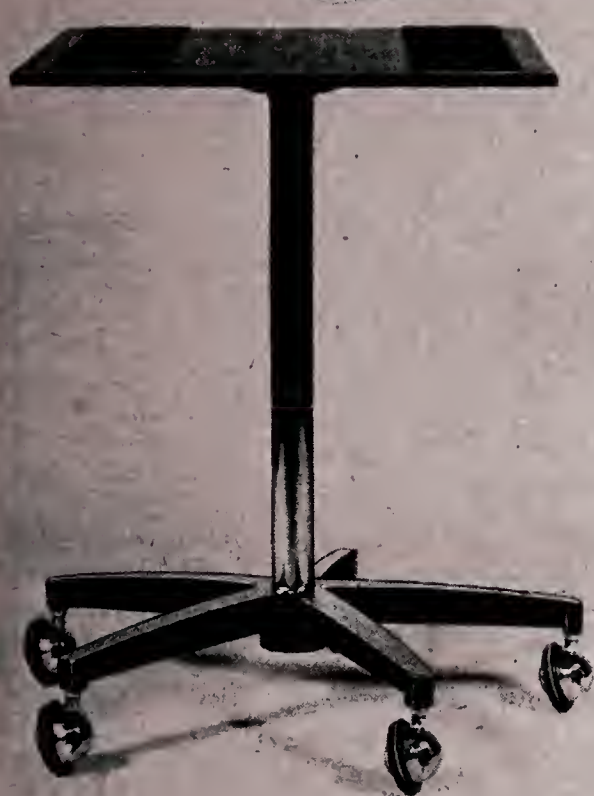
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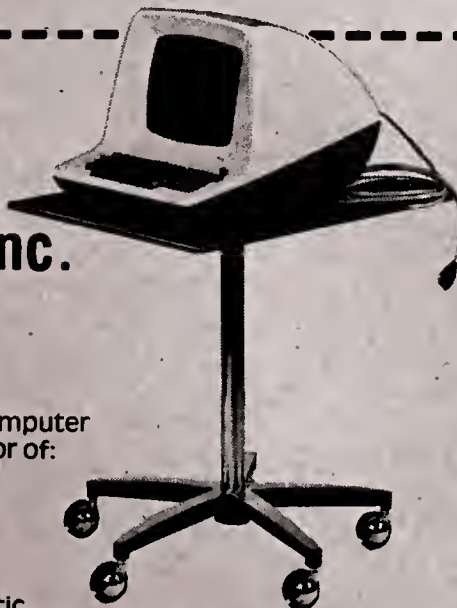


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# Has Weatherproof Enclosure Power System Comes in Self-Contained Unit

AUSTIN, Texas — Two of the problems that have traditionally plagued computer users seeking back-up electrical power for their installations have been assembling and interfacing the necessary components and siting them.

Randolph Engineering, Inc. is attempting to address those problems with a concept it believes to be unique: a self-contained computer power support system (CPSS), consisting of all the necessary components packaged in a weather-proof enclosure.

Designed for installation by helicopter or crane if necessary, the module is said to require a minimum of site preparation. In urban areas, roof installation is suggested, provided the cabling run is less than 400 feet; in rural or suburban areas where adequate space is available, the building could be installed at ground level adjacent to a computer installation.

The building, which is on a heavy, shock-resistant base (to minimize damage caused by jerking motions of a helicopter or crane), houses a rectifier/inverter, 10- to 15-minute battery bank, necessary switchgear, air-conditioning equipment and optional diesel generator and smoke detectors. Capacity of the unit ranges from 50 kVA up to 500 kVA, the firm stated, depending on user needs.

Although a spokesman conceded that in some cases roof installation might be "touchy," most modern buildings will accept the weight of the unit with no problems, he said. In some cases, an engineering

## No Major Snags

study might be necessary. The cabling run required to connect the module to the computer room is not a major problem, the spokesman claimed, since most buildings either have built-in chases to accommodate the power line or can have them easily added to the building.

Nor have diesel generators used for short-term emergencies run afoul of local pollution codes, a spokesman noted.

The company spokesman cited four advantages to the concept: the unit is self-contained; site preparation and installation are kept to a minimum; the entire unit is relocatable; and the capacity of the module is expandable to allow for growth of the computer equipment.

The company spokesman cited four advantages to the concept: the unit is self-contained; site preparation and installation are kept to a minimum; the entire unit is relocatable; and the capacity of the module is expandable to allow for growth of the computer equipment.

Among the optional features available on the unit are 415 Hz converters, security locks and an intrusion alarm, turnkey installation and telephone connections. Typical prices for modules with 15-minute batteries range from \$125,000 for a 50- to 75 kVA unit up to \$250,000 for a 500 kVA unit. The firm can be reached through P.O. Box 3272, Austin, Texas 78764.

## 3M Brings Out 300M-Byte Pack For CDC 9766s

ST. PAUL, Minn. — The 3M Co. has introduced a 300M-byte disk pack designed for use with Control Data Corp. 9766 and compatible disk drive units.

The Scotch brand 949/300 disk pack has 10 recording disks and uses 3M's "Crash-guard" protective coating, designed to resist damage to disk surfaces caused by head crashes. Each pack has 15,352 primary recording tracks and 133 alternates, according to a spokesman. A prerecorded surface defines track location at 384 track/in.

The pack lists for \$1,325 from 3M at P.O. Box 33600, St. Paul, Minn. 55133.

## Disk Drive Controller Designed for 360s, 370s

SUNNYVALE, Calif. — A disk drive controller designed to interface IBM 360/370 systems or plug-compatible mainframes with storage-module-device (SMD) type disk drives has been introduced by Microcomputer Systems Corp.

The MSC-1230 is said to provide all necessary logic capabilities to operate and control drives, while at the same time reducing space requirements and costs over IBM controllers. It is functionally identical to IBM's 3830 controller, except that it is limited to controlling four disk drives, the vendor said.

Intended to provide pack interchangeability between IBM 3330-type drives and industry-standard SMD drives, the controller has IBM-compatible error correction code (ECC) and built-in microdiagnostics, a spokesman for the firm said.

The MSC-1230, which costs \$20,800, also provides user-controlled and automatic off-line switching, so users can decide to take the controller off-line to run diagnostics while maintaining the integrity of the data channel chain, a spokesman said from 432 Lakeside Drive, Sunnyvale, Calif. 94086.

## Graphics COM Plotter Unveiled by Calcomp

ANAHEIM, Calif. — A graphics computer output microfilm (COM) plotter from California Computer Products, Inc. reportedly has a resolution of 80 line/mm on 16- or 35mm film.

The Model 1581, designed to operate off-line with Calcomp 925 and 930-100 controllers, can produce a maximum of 400,000 overlapping dots per second, the firm claimed. The overlapping dots form vectors that appear on the film.

The \$94,600 unit includes automatic CRT intensity compensation (to free operators from frequent intensity adjustment), hardware image rotation under program control and automatic monitoring of film, lens and camera status. A full set of supporting software is included and other software is optionally available.

In addition, the 1581 can be upgraded to a Model 1681

alphanumeric/graphic unit at the factory.

Additional information about the device, which a spokesman said is aimed at the high-precision engineering/scientific market, is available from the company at 2411 W. La Palma Ave., Anaheim, Calif. 92801.

## Brochure Covers 30 Series Power

SANTA ANA, Calif. — An eight-page illustrated brochure from the Industrial Controls Division of Emerson Electric Co. discusses the advantages to users of 415Hz solid-state uninterruptible power supplies (UPS) for IBM 30 series and other large mainframes.

The booklet is available from Emerson Electric at 3300 S. Standard St., Santa Ana, Calif. 92702.

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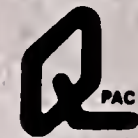
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Send application experiences, tutorials or critical essays — no longer than about six double-spaced, typewritten pages — to the report's editor, Brad Schultz, at CW, 797 Washington St., Newton, Mass. 02160.

Please include your job title, work address and telephone number.

# A View From the Other Side Turnkey Vendors Face Problems

By Jon R. David

Special to CW

Many stories are told about the problems end users experience in getting a turnkey system. Each and every problem experienced by an end user, however, represents a corresponding problem for turnkey vendors.

In addition, turnkey vendors have problems of their own unrelated to dealing with end users.

The turnkey system vendor's prime problem is the end user's lack of technical sophistication. The purchaser of a turnkey system wants all his problems solved. He views his purchase as a total solution, not just a set of equipment and programs. He does not care about megabytes,

monolithic integrated circuitry for structured programming; he wants order entry, billing and sales analysis.

## Analysis

An end user who has decided to obtain a system from a turnkey vendor first must specify his requirements. Typically, he will merely make up a list of functions to be performed. Sometimes he will document processing volumes. He almost never specifies internal or other controls or audit requirements.

A turnkey vendor most frequently gets a set of the work sheets, forms and reports from an end user. Unfortunately, such documentation of a manual system is insufficient for designing a turnkey system.

End-user "specifications" are often incomplete, incorrect or in other ways grossly inadequate. The turnkey vendor, in response to such specifications, proposes a system. He normally does not propose to meet the specifications, but rather sets forth a list of what he will provide.

The vendor's proposal may alter or omit some of the user's re-

quirements. It is up to the user to determine if the proposal meets his requirements. Nowhere, in either the customer specification or the vendor proposal, is the question treated of what the end user really *should* have.

The vast majority of turnkey installations must therefore be inadequate because of the above. If a turnkey vendor were particularly moral and bid only what he thought was "right" to end users, he would find himself bidding costs at least two to three times more than competitive bids, while promising no more.

The vast majority of end users cannot appreciate the difference in potential between one system proposed for \$50,000 and a second proposed for \$125,000. Similarly, they can not determine if the lower priced system is truly adequate or if the more expensive system is actually necessary.

They have the same set of promises from both vendors, but they do not have the sophistication to either properly determine their requirements or evaluate the proposals before them.

The turnkey vendor most frequently finds himself installing a system that winds up being less than his customer imagined it

(Continued on Page 42)

## DEC Boosts Support Of VAX I/O Channels

MAYNARD, Mass. — Multiple, medium-speed I/O channel support for Digital Equipment Corp. VAX-11/780 processors has been announced by the firm.

Until now, the VAX-11/780 accommodated up to four Massbus (high-speed) adapters and one Unibus (medium-speed) adapter. The new capability, which DEC claimed is the first in the minicomputer industry, allows up to four Unibus adapters to be connected to the machine, bringing to eight the maximum number of I/O channels on the 32-bit system, including the four Massbus adapters.

The maximum throughput speed of Unibus adapters is 1.5M byte/sec, while the maximum speed of the Massbus adapter is 2M byte/sec, the spokesman said.

The multiple-Unibus feature offers increased system throughput by permitting concentration of higher speed and lower speed peripherals on separate channels,

according to DEC.

Higher performance, short-latency devices such as disk units, direct memory access interfaces and analog-to-digital converters can use one Unibus, while slower, character-interrupt devices such as line printers, card readers and terminals occupy another, the spokesman explained. That arrangement allows both classes of peripherals to operate at their respective performance levels, he added.

### Supported by Software

The multiple-Unibus feature is supported by the VAX/VMS operating software and the entire diagnostic system, the spokesman said.

Additional Unibus adapters will be available as self-contained assemblies in a 4-in. backplane with power supply. They are priced at \$11,500 each. Deliveries will begin in September from DEC at 146 Main St., Maynard, Mass. 01754.

## CS/30, CS/60 Now Handle More Dasher CRT Terminals

WESTBORO, Mass. — Data General Corp. has increased the number of Dasher CRT terminals that can be accommodated by the CS/30 and CS/60 members of DG's Commercial Systems (CS) family.

The microprocessor-driven CS/30 introduced by DG a few months ago [CW, April 30], can now handle up to four Dasher CRTs. The CS/60 Model 6 system can take four more Dashers than previously possible, for a

total of 16 active terminals in a maximum configuration.

DG also expanded the CS/60 Model 6's main memory capacity to 512K bytes.

The Dasher D2 CRT terminal for the CS/30 and CS/60 costs \$2,290 with detachable keyboard and 25 ft of cable. An expansion chassis, required to support the fourth terminal in a CS/30 configuration, costs another \$1,000.

DG is located on Rt. 9 in Westboro, Mass. 01581.

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## Vendor's Earliest DP Machines

# Ten Years Later, CA 808, 208 Still Humming

VAN NUYS, Calif. — Ten years after a publications department here installed the earliest versions of Computer Automation, Inc.'s computer equipment, the machines are still functioning smoothly.

The Data Systems Division of Litton Data Systems, which uses the equipment for text editing, attributes the successful development of its operation partly to the "unusually high reliability" of the CA 808 and 208 machines (one of which carries Serial No. 87), according to Dave Decker, manager of Publication Systems for the division.

Adding to the success are CA's support and assistance and the ingenuity

of the Data Systems Division's engineering team, he added.

"We're now running five complete computer systems in our shop," Decker said. "They not only are editing textual material in an on-line, computerized mode, but they are also pre-processing material for our photocomposition device, a Singer 8400."

The division's output is about 150,000 pages a year.

### Once Upon a Time

The shop's story began in late 1969, when Decker's group was using IBM's Administrative Terminal System (ATS). ATS, however, relied on a telephone hookup that precluded han-

dling classified material — a requisite for the division, which manufactures military command and control systems.

Decker learned of a system being marketed by Data Instruments, Inc. (DI) called Dataplex, which incorporated the CA computers to bypass key-punching. Dataplex used a DI R30 cassette recording device built on an Olympic electric typewriter "with a lot of electronics hung around it," Decker noted.

Since the Dataplex equipment had some editing capabilities, Litton acquired it — a decision that turned out to be ill-timed. Shortly thereafter, DI went out of business.

Electing to tackle the problem headlong, Litton hired the DI engineer who had worked with the system. He has been in the forefront of its technical innovations at Litton ever since.

An existing customer base for the DI system unexpectedly provided the impetus for Litton to become quickly proficient in the maintenance of the equipment. Lloyd's Bank, California Federal Savings and Southern California Edison had all acquired these systems but had no resources to maintain them, so they signed maintenance contracts with Litton.

Furthermore, DI's default had made available a considerable amount of system equipment, and Litton was able to pick up a good share of it at low prices.

### Special Attention

Software for the Dataplex system was also given special attention. A former software consultant with DI was hired to write Litton's programs, and he proved to be "a genius with word processing software," according to Decker.

In addition, a former technical writer "became so interested in the operation that he switched to programming and also has been instrumental in the development of application software," Decker said.

"With such a resourceful group of people in our processing section, we never stopped improving the software and making modifications to the hardware," he continued. "Anything we could think of to make the system better, we'd just do it. That's why it's lasted so long."

It was the constant modification of the hardware "to keep up with the times" that brought the Litton people into close contact with the CA people. "They were very helpful, providing us with documentation and fabrication drawings that were no longer of use to them but were very helpful to us," Decker said.

### Machines Rewired

In his modification, DI's former engineer, Jerry Poe, took the original 808 and 208 8-bit machines and rewired them into 208 and 108 configurations respectively, increasing memory cycle speed from 2.67 micro to 1.4 micro sec.

The increase also resulted from the addition of solid-state memory boards, providing a total memory capacity of 8K bits of core by 32K bytes of semiconductor memory, capable of increasing to 64K bytes.

The solid-state boards selected were designed for hobby kits and cost \$140 per board. That modification has added at least another year's life to the system, according to Poe.

The major portion of the division's work is producing technical manuals, about 50% of which are in tabular form. While Litton is experimenting with more up-to-date peripherals to attach to the system, the operation is presently running in batch mode.

The main problem with the system is that the terminal operator is unable to see the text being entered until it is produced on hard copy. With CRT terminals and disk drives, however, the system will become real-time and on-line.

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ESC. And End Block character. A New Line character sequence. A field separator. And even a function sequence preamble.

Its status displays on the screen give you a conveniently wide range of information at a glance. While its special symbols indicate the entry of control characters in memory. Also, all control characters can be stored using the escape sequence or program mode. And the Field Protect Mode allows rapid data entry into forms or instruction pages.

## **THE ADM-42 WILL HAND YOU ANOTHER LINE.**

The terminal's displayed data is formatted in 24 lines per page, 80 characters per line. And, to top it off, it comes with a 25th line established and reserved exclusively for status indicators and messages of up to 79 characters.

As if all this weren't enough, the ADM-42 has an impressive list of options. Like synchronous transmission with various line protocols. An extended memory capable of adding

data space up to a maximum of 8 pages. And programmable function keys, to name but a few.

## **THE ADM-42 IS ONE TOUGH ACT TO FOLLOW.**

The ADM-42 has just about everything. Including a microprocessor that increases reliability and ease of operation. Any way you look at it, in fact, it's one pretty smart buy.

So if you're thinking of upgrading to a more intelligent terminal, at a more than reasonable price, call us today. Or better yet, contact your local distributor.

We'll show you how easy it is to move up to the ADM-42.

The terminal that's so smart, you'll swear it's got a mind of its own.

## **ADM 42** **Getting smarter** **all the time.**



**LEAR SIEGLER, INC.**  
**DATA PRODUCTS DIVISION**

## PCC Model 2000 Gains More Disk, CRT Support

CHATSWORTH, Calif. — Added disk capacity and more support for CRT terminals have been announced for Pertec Computer Corp.'s (PCC) Model 2000 desktop microcomputer system.

Users can expand peripheral disk capacity by up to 40M bytes of rigid disk mass storage and attach up to four more CRT terminals than before to the small business system, a PCC spokesman said. The upgrades can be performed at the customer's site or ordered with new PCC 2000s.

Up to four 10M-byte fixed-disk drives and a hard-disk controller can now be connected to the PCC 2000 to work with the 1.2M bytes of floppy disk capacity built into the system, according to the spokesman.

A new hard-disk controller, designed specifically for the PCC 2000, contains its own microprocessor. The controller transfers data via direct memory access at 750,000 bytes/sec, the spokesman said.

Up to four additional CRT terminals can now be added to the PCC 2000 so that five terminals may run programs concurrently — a capability supported by PCC's Multiterminal Executive (MTX) operating system. MTX reportedly operates within the standard 64K bytes of main memory on the PCC 2000, eliminating any need for additional memory.

The operating system can be licensed separately for \$1,000 and additional CRT terminals are available for less than \$2,000 each. When configured with a controller and a 10M-byte disk drive, the PCC 2000 costs \$19,900. Additional 10M-byte increments cost \$7,495 each from PCC's Computer Systems Division at 20630 Nordoff St., Chatsworth, Calif. 91311.

## Problems Face Turnkey Vendor Hoping to Meet User Expectations

(Continued from Page 39)

would be — all he specified, all he bought, but not all he thought it would be. A dissatisfied customer is frequently a customer who is hesitant to pay, and this is another problem of a turnkey vendor.

Turnkey vendors, in addition to standard operating expenses such as rent and salaries, have heavy financial commitments to equipment vendors. Taking a customer to court is always costly in both time and money and is never a winning proposition. Only a few very large turnkey houses could even afford to consider doing such a thing.

The typical turnkey vendor, in order to get paid, often must put forth significant extra efforts in order to make his system, as purchased, into one that is more in line with what his customer expected. Such additional efforts increase the amount of time to do the job, of course, and cost the turn-

key vendor additional money.

Any and all system or program changes result in problems to a turnkey vendor. His customer expected a perfect system for the price he agreed to pay. When any changes become necessary, even if such changes result from obvious customer errors or omissions, the end user is hesitant to pay more than minimal dollars for such changes.

These necessary changes and additions, however, often require much more than minimal efforts to implement.

### User Personnel Changes

A turnkey vendor works closely with personnel at end-user sites. Typically, an end user's requirements are made up of the requirements of his key personnel. A personnel change at an end user site is a tremendous problem for a turnkey vendor.

New controllers, production managers, sales managers and the like often bring with them requirements totally different from their predecessors'. Such new requirements often entail virtually total software revision and not infrequently require different hardware.

The turnkey vendor is always delayed while waiting for the changes required by new customer personnel and always has the problem of negotiating prices. For example, a new controller may specify certain internal controls previously omitted; the turnkey vendor wants to charge for adding them, whereas the end user argues that such "basic" (although unspecified) items were part of the purchased system.

### Three Types of Vendors

There are three basic types of turnkey vendors:

- The "package" vendor, which delivers an existing set of programs with little or no modification and a predetermined hardware configuration.

- The dedicated vendor systems house, which will always deliver equipment from the same manufacturer and which, although not delivering full packages, does reuse large portions of previously written programs.

- The custom turnkey vendor, which selects its equipment manufacturers and models only after reviewing a situation and then must develop programs for the selected hardware.

Within all three types of turnkey vendors there are ones that concentrate in only one industry and others that will work for any company whose applications they can understand.

The packaged systems ven-

dor can show his programs working before he sells them, but most often cannot provide the software customization necessary to "best" fit an individual situation. In addition, he frequently cannot offer certain peripheral equipment that is necessary or cost-effective.

The dedicated equipment turnkey vendor cannot avail himself of either hardware or software advances made or offered by any vendor other than the one with which he deals. The custom house, although able to select what best fits a situation in terms of hardware, must develop the bulk of its software from scratch and, of course, must add this development cost into its selling price.

Turnkey vendors specializing in an industry have severe difficulties outside that industry, and, even within their industry, do not have the particular variations of experience particular customers feel are necessary for their situations. The general vendor cannot substantiate expertise in a given industry.

In competing with one another, each of these vendors has strong points, yet is deficient in at least one key area.

Since none of these types of turnkey vendors is universally "best" for all situations, it is impossible for any individual vendor to fulfill the promises or potential of all his competitors. These competitors, in terms of the impressions they make on end users, are another problem of turnkey vendors since they build customer expectations impossibly or unrealistically high.

David is vice-president of Systems R&D, Inc. in Fort Lee, N.J.

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# Field Testing Under Way Micro-Based Unit Aids in Crop Care

By Ann Dooley  
CW Staff

EAST LANSING, Mich. — An on-site microprocessor-based instrument designed to curtail crop damage while reducing the amount of pesticide used — a feat that would save growers money and also help the environment — is currently being tested in the field.

Developed by researchers at Michigan State University (MSU), the unit is currently being tested on apple scab disease but can be used on most crop diseases with only minor alterations, according to the research team.

Air temperature, relative humidity, rainfall and leaf wetness serve as primary inputs. Growers use a keyboard and liquid crystal display to monitor current weather conditions, make apple scab outbreak predictions and determine the number of hours remaining before crop damage sets in, allowing growers to spray any one of five different fungicides on the fields.

Since the unit is located out-

doors, it has to be resistant to adverse conditions. Its features include low-power dissipation through the use of CMOS circuit, rugged construction and insensitivity to variations in temperature.

It is also dust proof and watertight, has a high tolerance for RF radiation and lightning and is easy to maintain and operate.

MSU researchers designed the microprocessor unit to alert apple growers to approaching apple scab infection periods. Alerted in this way, the growers know exactly when to spray and can eliminate frequent and unnecessary sprayings.

The apple grower uses a keyboard and a four-digit alphanumeric display to interrogate the instrument and determine whether an infection period is likely to occur. Using this approach, the growers could reduce the use of fungicides by two to three spray applications in most years and by up to 75% in some years, depending on the weather, the research team claimed.

Outlining the importance of the



Researcher takes a reading on the apple scab disease predictor. The white box houses the temperature sensors.

unit, the researchers noted that apple growers in the Great Lakes area typically use 10 to 15 chemical spray applications annually to control nearly 20 pests, and up to four different chemicals are used in any given application.

In 1971, 12 million pounds of pesticides were used on the apple crops, bringing the annual cost of spraying to more than \$100 per acre.

Using apple scab as an example, the research team noted that growers spray their crops regularly, although the disease occurs only when certain conditions of wetness and temperature are met on the surface of the leaves and fruit.

These known variables are entered into the system, which warns the grower when those conditions arise. The battery-powered instrument predicts the likelihood of the occurrence of the disease and recommends the proper spray.

The system had to be mounted

on a post in an orchard and had to operate through all possible atmospheric conditions including dust, snow, rain, hail, lightning, and RF interference from farm machinery. The battery also had to be capable of functioning through an entire growing season.

In addition, the system had to incorporate ease of installation and operation and minimal training. Routine maintenance requires a minimal time commitment, and the system is rugged in construction and is easily reconfigurable for other applications.

The control section of the unit contains the processor, control circuits and memory — both random-access memory (RAM) and read-only memory (ROM). These operate in unison to coordinate the overall sequencing of the instrument.

The RCA 1802 microprocessor, an 8-bit CMOS processor, was  
(Continued on Page 44)

## Applesoft, Auto-Start Available on Apple II

CUPERTINO, Calif. — Apple Computer, Inc. has introduced the Apple II Plus, an enhanced version of the Apple II computer offering resident Applesoft Extended Basic and an auto-start control read-only memory (ROM) for start-up and screen editing.

Previously available as a separate, extra-cost option, Applesoft has been added to the Apple II Plus as a standard feature because of customer demand, the firm said.

The auto-start control ROM automatically puts the Apple II into Basic mode when the system is turned on and allows a user to begin programming without preliminary commands.

Automatic disk load for disk-based Apple systems allows the auto-start ROM to load and run a user-specified program from the disk, making it possible to create "turnkey" packages. In addition, easy screen editing cuts screen editing keystrokes up to

80%, the firm claimed.

The ROM also includes reset protection, which halts the program and puts the Apple into Basic mode without losing program instructions or data.

The Apple II Plus is available from Apple dealers and costs \$1,195 for the 16K-byte unit, \$1,345 for the 32K-byte unit and \$1,495 for the 48K-byte unit.

Apple Computer headquarters is at 10260 Bandley Drive, Cupertino, Calif. 95014.

## Student's Simulation Wins Prize

ARLINGTON, Texas — Move over, Frank Lloyd Wright! A ninth grader here is using a microcomputer to determine the most advantageous lighting arrangement for a building still on the architect's drawing board.

Fourteen-year-old Brandon Rigney III of Gunn Junior High is not using the program professionally. However, he recently won top honors in a science fair

competition with the program, entitled "Designing Lighting Patterns for Efficiency Using Computer Simulation."

The construction of the scale model used to experiment with different ideas before reaching final decisions is usually a costly and time-consuming project. But the junior high school student's program demonstrated that by planning lighting requirements on the computer before implementation begins, time and money can be saved.

Rigney began work on his project in December and spent approximately 130 hours writing and debugging his programs, which sometimes took almost four hours to run.

### Birth of an Idea

The idea for his program came one day in school when his teacher arranged the student's desks in the center of the room to make the best use of the lighting

situation. Rigney wanted to see if he could simulate the lighting patterns of the room to show the best seating arrangement and found that it compared exactly.

Rigney developed the program after doing research on architecture and entered his program in the Arlington Science Fair.

In addition to developing his scale model program, Rigney uses his Radio Shack TRS-80 to conjugate French verbs, quiz himself for history tests and even to help work out chemical equations.

The 14-year-old only began using his system within the last year when his father, learning of his son's interest in microcomputers, shopped around and brought the TRS-80 home.

Eventually, Rigney plans to become a stockbroker. He will, of course, use a computer in his work, and he has already begun to write programs for business and economics, he said.

## Micros Now for Rent

BRIDGEPORT, Conn. — Radio Shack and Apple Computer, Inc. microcomputers can now be rented, giving the user a chance to see whether he really wants the equipment, according to Connecticut Information Systems Co., the firm renting the equipment.

The user can either return the equipment at the end of the rental period or apply half of the

rental price toward purchase.

Rental costs 15% of list price for the first month and 10% for each subsequent month. A deposit is required and is refunded upon return of the equipment.

A catalog costing \$1 — creditable toward rental — is also available from Connecticut Information Systems, 218 Huntington Road, Bridgeport, Conn. 06608.

MICROCOMPUTING

## Music Board Works on 6800

GARLAND, Texas - Percom Data Co. has introduced the Newtech Model 68 Music Board, which produces sounds such as melodies, sound effects, Morse code sounds and train songs. The board is a member of Percom's bus product line.

The Music Board uses one I/O slot of the Southwest Technical Products Corp.'s (SWTPC) 6800 computer and is supplied with a user's manual that includes a theory of operation, a Basic program for writing musical scores and an assembly language routine for program execution.

The card includes address decoding, digital-to-analog conversion, audio amplification circuits and its own speaker.

Also available on cassette or mini-diskette is Americana Plus, 14 tunes

ranging from "sing-alongs" to Chopin's "Minute Waltz." The cassette version is compatible with the firm's CIS-30+ cassette/data terminal interface unit and the SWTPC AC-30 unit.

The disk version runs on Percom's LFD-400 system using Minidos-Plus.

The Music Board costs \$59.95, the cassette version of Americana Plus costs \$15.95 and the disk version costs \$19.95. Orders can be placed through a toll-free number, 1 (800) 527-1592.

## Mapmakers to Meet

RESTON, Va. — A symposium on automation in cartography will be held Nov. 5-8 at the Sheraton Inn and International Conference Center here.

Leading cartographers, geographers and other experts are expected to chair sessions and present papers at the conference, which is titled "International Symposium on Computer-Assisted Cartography." The symposium is sponsored by the

American Congress on Surveying and Mapping and the American Society of Photogrammetry.

Registration costs \$80 if received by Oct. 15. After that, the meeting will cost \$125.

More information is available from James A. Smith, Conference Management Branch, NCHS, Room 2-12, Center Building, 3700 East West Highway, Hyattsville, Md. 20782.

## Micro-Based Unit Helps Cut Crop Damage

(Continued from Page 43)

selected for its hardware design and ruggedness. It fetches and executes the data acquisition, prediction, operator interaction and debug programs.

The memory stores the program and retains the prediction data.

Four random events — rainfall occurrence, keyboard service requests, clock pulse occurrence and debug service re-

quests — must be monitored by the system. The data is continuously accumulated and provides the apple scab prediction algorithm with information.

### Rain-Activated

The data is present in the form of a pulse. Upon collection of 1/100-in. of rain, a switch is closed and the system activated. The pulse is debugged by the software. The keyboard and associated encoding circuit form the input portion of the user-machine communication link.

In addition to accumulating data on rainfall, the unit determines leaf wetness. When leaf wetness drops below a certain level, the unit is alerted to the occurrence. The Direct Memory Access (DMA) mechanism measures temperatures via thermometers attached to the unit.

The program's accumulated data and predictions are presented to the user via the alphanumeric display.

### Still Being Tested

Although the system is still being tested, the results to date indicate it is as successful, if not more successful, than traditional methods of heavy spraying, according to the researchers. Once the unit becomes available commercially, it should allow optimal timing of spraying, encourage a reduction in the use of pesticides, retard the development of pest strains resistant to pesticides, save money and reduce the danger to the environment.

Growers should also be able to recover their investment in two years through savings in chemicals.

The research team consisted of P.D. Fisher, professor of electrical engineering, A. L. Jones, a graduate student in electrical engineering and D.L. Neuder, professor of botany and plant pathology at MSU.

# The Nodes Know.

Find out how much in our July 30th Special Report on *Distributed Processing*. As the cost of communication goes up and the price of hardware goes down, are minicomputers in a distributed network a more desirable alternative? Is distributed data processing the new wave of the future? Here are some of the issues we'll be taking a look at in this Special Report:

- When does an organization go to a DDP network?
- How can the change take place cost effectively and with a minimum of disruption to the organization?
- What are the potential drawbacks of having more intelligence and autonomy in the field?

Edited by Brad Schultz, this Special Report will provide answers to these questions along with a discussion of the profound impact DDP is having today on the internal operations of large organizations.

If you're a user who watches the trends, you'll want to have the most up-to-date information about DDP and you'll find it in our July 30th report. Closing date is July 13th.

And if you're marketing products or services in the DP field, you'll want to make sure your ad is there. Contact your *Computerworld* salesman, or call Frank Collins at (617) 965-5800.



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'I Can Understand No Children; Why Do You Dislike Computers?'

# COMPUTER INDUSTRY

## Lessor Sues Lloyd's for Nonpayment

By Marguerite Zientara  
CW Staff

BALTIMORE — Federal Leasing, Inc. has filed a \$627 million suit against Lloyd's of London and 17 other British insurance firms in U.S. District Court here on charges of failure to pay insurance claims for early lease terminations on IBM computers and peripherals.

Federal Leasing, a third-party computer leasing firm in McLean, Va., is seeking \$27 million in actual unpaid claims, \$50 million in consequential damages and \$500 million in punitive damages for Lloyd's alleged failure to honor the insur-

ance claims, according to Bill Evans, Federal Leasing's secretary/treasurer.

The firm claimed customers terminated 21 leases for IBM 370 CPUs and peripherals after IBM came out with its 30 series in 1977, offering higher performance at lower cost.

Federal Leasing had contracts with the National Security Agency, the states of Oregon, Wisconsin and Florida, the State and University of Missouri and Transamerica Corp.

Lloyd's and the other insurers underwrote the "J" policies, as they are known, from 1974 to 1977 to insure

third-party lessors against losses that could be incurred if customers cancelled seven-year leases before their full term [CW, April 23].

Most contracts were on a lease-purchase plan, but provided for early termination, the suit claimed.

Lloyd's recently confirmed it has paid "some claims" on the policies, which were issued to about 16 leasing firms, mostly in the U.S. The total face value of the policies issued is estimated at about \$1 billion.

While Lloyd's has paid Federal Leasing  
(Continued on Page 49)

## Plans 64K Chip Announcement

# National Semi: First, the Good News . . .

By Jeffrey Beeler  
CW West Coast Bureau

SANTA CLARA, Calif. — National Semiconductor Corp. has good news and bad news for vendors seeking to adopt the latest in hardware technology.

The good news is that National Semi expects to announce its first 64K-bit random-access memory (RAM) chip later this year, probably in September.

The bad news is that large-scale shipments of the device aren't scheduled to begin until 1981.

To make matters worse, National Semi isn't the only 64K RAM manufacturer anticipating long delivery leadtimes for its product. "Supplies of 64K chips are going to be short throughout the industry in 1980," predicted Gene Miles, marketing director for National Semi's Memory Components Division.

But when the state-of-the-art storage devices finally do become available, the benefits for vendors and users alike are expected to be significant. At least as far as his own firm's product is concerned, Miles sees three main advantages in converting from 16K to 64K chip technologies:

- Lower bit cost. By 1981 or 1982, the cost of 64K RAMs will roughly equal that of 16K devices, at least at the component level. At the systems level, the two technologies could achieve cost parity even sooner.

- Lower power consumption. National's Semi's state-of-the-art memory circuit is expected to consume 4mA at 5V, or 20mW, in standby mode and 40 mA at 5V, or 200 mW,

while active. In other words, the device will require .3 microW/bit in standby and 3 microW/bit when active.

- Increased reliability through reduced parts counts. By 1981 or 1982, 64K chips will reportedly equal the 16K variety in reliability.

Although National Semi plans to produce its upcoming memory product primarily for external consumption, relatively small quantities of the part will probably go to the firm's own systems operation, which manufactures an IBM 370-compatible mainframe family named the Series 400.

Potential customers for the 64K RAM will include Burroughs Corp., Honeywell, Inc., Univac and almost any other CPU maker

with plans to incorporate state-of-the-art memories in its designs, Miles said. National Semi might also supply the high-density memory circuit to IBM, he added.

Compatible with Texas Instruments, Inc.'s pin-out configuration, the National Semi device will qualify as a monolithic chip and will come in a 16-pin dual in-line package.

Unlike the 64K component introduced last year by IBM, the National Semi product will incorporate only memory circuitry and will provide little or no on-board redundancy. The IBM chip, by contrast, incorporates logic as well as memory and contains some redundancy that reportedly allows it to remain usable even if parts of the component fail.

## Adapso Asks Congress to Curb Banks' Public DP Offerings

WASHINGTON, D.C. — The Association of Data Processing Service Organizations (Adapso) has taken to Congress its fight against the public marketing of DP services by national banks.

In a June 22 letter to Rep. Fernand St. Germain (D-R.I.), Adapso executive vice-president Jerome Dreyer argued that offering DP services "is neither 'incidental' to the business of banking under the National Bank Act nor 'closely related' to that business under the Bank Holding Company Act."

St. Germain's banking subcommittee has been holding hearings on the bank holding company legislation. Current law and government regulations permit bank holding company subsidiaries to engage in specified nonbanking activities, including certain DP services. Dreyer argued that the law has been too broadly interpreted, resulting in the entry of banks into commercial DP services contrary to the intent of the statute.

"The Bank Holding Company Act, with its treatment of nonbanking computer services  
(Continued on Page 48)

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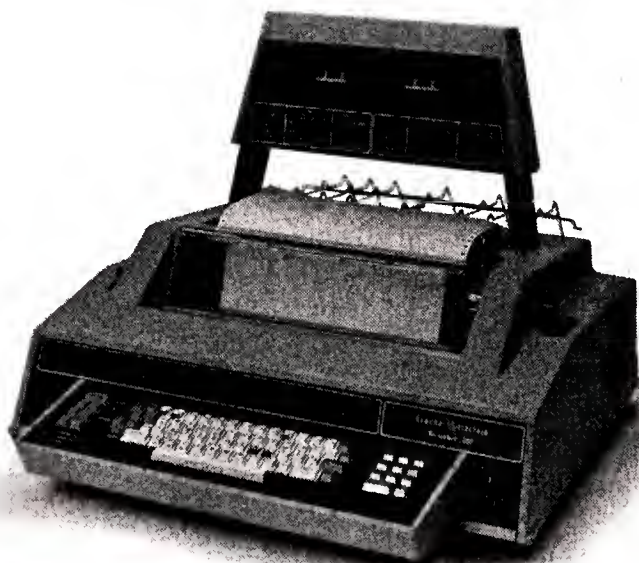
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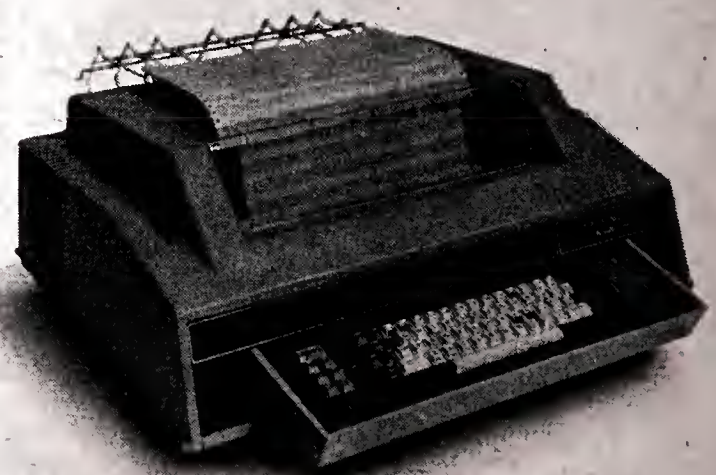
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## Trial of U.S. vs. AT&T To Start Sept. 1, 1980

WASHINGTON, D.C. — The Justice Department's anti-trust case against AT&T will go to trial on Sept. 1, 1980, U.S. District Judge Harold H. Greene decided recently.

Rejecting a Justice Department proposal to start the trial this Nov. 1 on "background" aspects of the case, Greene said he does not expect the trial to "become a textbook example of the impotence of the judicial process to deal with massive and complex litigation."

Green said it was almost impossible to differentiate "background" aspects of the case from "essential" aspects, and he apparently plans to begin the trial "as a whole" on the set date, according to an AT&T attorney.

### Stipulation Method Required

The judge has also instructed the parties to use the "stipulations" method proposed by AT&T's attorneys. The stipulations method requires both sides to negotiate mutually acceptable language for the uncontested facts.

Justice Department attorneys had requested use of the "admissions" method, which requires one party to state a fact and request the other side to admit its truth.

Government lawyers have pressed for the earliest possible trial date and contend that with the stipulations method, it "could take years" to enter all facts.

Now in its fourth year, the case has been delayed pending resolution of various issues by the U.S. Court of Appeals here and the Supreme Court. The case was assigned to Judge Greene on June 22.

## Wescon/79 to Focus On Microprocessors

SAN FRANCISCO — Microprocessors and their practical applications will highlight a 32-session technical program at Wescon/79, Sept. 18-20 here.

Nine sessions will focus on the computer-in-a-chip. Topics will include memories for the microprocessor age, 16-bit microcomputer board-level products, microcomputer interfacing, bipolar LSI for microprogramming and single-chip microcomputers.

In addition, an examination of four critical subjects — en-

ergy, pollution, vehicular safety and mass transit — will occupy a panel discussion entitled "Super Solutions to Super Problems."

And to commemorate the 100th anniversary of Thomas Edison's invention of the incandescent light, a special session on his contributions to electronics will be sponsored by the Institute of Electrical and Electronics Engineers.

For more information, write to Wescon, 999 N. Sepulveda Blvd., El Segundo, Calif. 90245.



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## To Coordinate Three Operations

# Xerox Starts Memory Systems Unit

SANTA CLARA, Calif. — Xerox Corp., in an effort to become "a single OEM source for a total line of rotating disk products," has set up a group management team to coordinate its three disk memory operations.

Called Xerox Memory Systems, the group consists of two Xerox subsidiaries, Shugart Associates and Century Data Systems — acquired from California Computer Products, Inc. earlier this year [CW, March 26] — plus a new unit, Xerox Magnetics, formed to manufacture rigid magnetic disk media for in-house use.

Donald J. Massaro, former president of Shugart, was named president of Xerox Memory Systems, while George H. Sollman, Shugart's director of product management for three years, was appointed vice-president, responsible for strategic planning and management of the new group.

To augment outside media supplies, Xerox Magnetics will provide primarily 14-inch rigid media platters to Shugart and Century Data, each of which will operate as a profit and loss center with its own sales force, Sollman said.

### Division of Responsibility

He noted that manufacturing responsibilities for the two acquired subsidiaries were divided as follows: Shugart will manufacture low-cost, low-capacity, high-volume products, while Century Data will concentrate on high-performance, medium-volume products.

Further, Shugart will handle production of floppy disks and fixed disks in the 60M-byte or greater capacity range. Century Data products will include 20M-byte fixed disks and removable disks.

Generally, this breakdown does not deviate from each firm's traditional product lines — for Century Data, the Trident, Marksman and Hunter rigid disk drives; and for Shugart, floppy disk drives for small business systems and word processing equipment. Sollman admitted, however, there will be some overlap in responsibility for Shugart's SA4000 series of Winchester-type fixed-drive systems, introduced last year in 14.5M- and 29M-byte versions.

The Shugart and Century Data names will be retained on products each manufactures, Sollman noted.

### Resource Centers

In addition to providing economic resources to help each Xerox Memory Systems unit meet "the significant cash requirements of producing stand-alone units," Sollman said Xerox will make available

several of its resource centers to the three operations.

These centers include two California facilities — at Palo Alto and El Segundo — involved in work on thin-film heads, thin-film plated sputtered media, optical disks and better utilization of large scale integration (LSI) semiconductor technology.

Also available to Xerox Memory Systems is a materials research center in Webster, N.Y., that conducted the basic research for Xerox drums and copier technology.

While commenting that Xerox Magnetics "will help to ensure a source of 8-inch media for future products," Sollman refused to discuss when Xerox Memory Systems will introduce an 8-inch Winchester drive, a market for which at least seven disk manufacturers introduced products at the recent National Computer Conference.

Industry sources, however, stated that Shugart showed an

8-inch disk to 40 different groups of people at its hotel suite during NCC.

Xerox Memory Systems is part of the firm's Information Products group, consisting also of Diablo Systems, Inc., Versatec, Inc. and Xerox Business Systems.

### Other Changes

Besides Massaro's and Sollman's promotions, other management changes resulted from the formation of Xerox Memory Systems.

Replacing Massaro as Shugart president was James J. Bochnowski, Shugart's vice-president and chief operating officer for the past two years.

In addition, Ronald E. Kubec, former director of magnetic media operations at ISS-Univac, was named president of Xerox Magnetics, and James Payton, executive vice-president of Century Data Systems, was promoted to president.

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## Papers Sought for Congress On DP Services Industry

SAN FRANCISCO — Papers and presentations are being sought for the Second World Computer Services Industry Congress, set for June 23-25, 1980, at the St. Francis Hotel here.

The three-day meeting will stress trends in international technology, government, management, software, personnel, marketing and communications that affect the computer services industry, according to Jerome L. Dreyer, executive vice-president of the Association of Data Processing Service Organizations (Adapso), Inc., administrator and host of the 1980 congress.

Adapso expects more than 1,000

delegates representing about 30 nations to attend the congress, the second of its kind since the 1978 meeting in Barcelona.

Joining Adapso as conference participants will be the European Computer Services Association, the 1978 host; the Japan Software Industry Association; and the Canadian Association of Data Processing Servicing Organizations.

Registration, including certain meals and receptions, costs \$450 for Adapso members, \$550 for non-members and \$225 for spouses and other family members.

Adapso is at 1925 N. Lynn Street, Arlington, Va. 22209.

## Adapso Pressing for Curbs On Banks' DP Offerings

(Continued from Page 45)

activity, is a serious threat to that fair competition which is necessary for advancement of the computer services industry and the American economy," he said.

"This threat has been exacerbated by the Congress and the Federal Reserve Board, which have refused to perceive the abundant competitive problems posed by the unrestrained entry of vast and integrated economic enterprises with special government franchise and privilege into the data processing industry."

According to Dreyer, "Adapso contends that the ever advancing technology which marks the computer ser-

vices industry has outpaced law and regulation." He pointed to the application by the Citibank organization to offer "worldwide computer services" to nonclients as a prime example of the anticompetitive ramifications of "this particularly stagnant regulatory language."

The Citibank application does not meet the requirements of present banking law and regulations that allow banks to use excess computer capacity to process "financially oriented data," he said.

"Citicorp proposes to publicly offer through Citishare a worldwide time-sharing and computer services network" serving 286 cities in 41 states as well as 17 foreign countries, Dreyer noted. "By no stretch of the imagination" can the proposed services be offered through excess computer time, he claimed.

"Only if the storing and processing of financially oriented data is restricted to computer services for the internal operations of the held bank, the holding company and its other subsidiaries, then may the activity in question be deemed 'closely related' to the business of banking," Dreyer told St. Germain.

### 'The Aura of Banking'

"The phrase 'financially oriented data' has been misused to cloak the DP activity in question with the aura of the business of banking," Dreyer continued. "The assumption illogically reached is that, if it's financial, then it must be part of the business of banking."

Carried to the extreme, "the available regulatory language would allow a bank holding company subsidiary to operate the computer check-out systems of any and all the extant store chains, to monopolize electronic funds transfer systems and to process the computer systems of state lotteries, whether or not a banking client is involved."

Noting that some banks have been able to offer payroll processing plans for their clients free of charge and to undercut commercial computer services companies in offering other types of services, Dreyer called for tighter regulatory language.

He urged revision of the "closely related" language to preclude the public offering of DP services by banks and asked for a stricter definition of "financially oriented data."

If banks are permitted to continue offering commercial DP services, at the very least Congress should mandate that fully separate subsidiaries for that purpose be established by the holding companies, Dreyer said.

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# Branscomb Calls for Federal R&D Policy

WASHINGTON, D.C. — Contrary to popular wisdom, American industry has not lost its technical capability or abandoned research and development, a top IBM executive told a congressional committee recently.

"It is the government, not industry, which has exhibited the most uncertainty about its science and technology investment in recent years," Lewis Branscomb, IBM vice-president and chief scientist, told the Senate Subcommittee on Science, Technology and Space June 27.

Branscomb appeared before the subcommittee to "put the facts as they are."

The panel is considering legislation to spur technological innovation in the U.S. The National Technology Innovation Act, introduced by subcommittee chairman Sen. Adlai Stevenson (D-Ill.), would sponsor centers for joint industry-academic research.

The IBM vice-president backed the legislation, arguing that industry already has its R&D house in order and it is now time for government to establish a coherent policy toward commercial innovation.

In 1980, private industry will fund approximately half of all the R&D in the U.S. and will perform 72% of a total \$57.3 billion national effort, according to Branscomb. "In constant dollars, industry investments in R&D have moved steadily upward (since 1962), while federal activities have only recently reversed a declining trend. This is hardly a picture of American industry going down the tubes," Branscomb said.

He added that "while industrial R&D is heavily concentrated in high-technology industries such as electronics, computers and communications, as one might expect, some of the most dramatic increases in R&D funding are emerging in industries such as iron and steel, stone, clay and glass and machinery."

"Thus the conventional wisdom that older industries have lost their confidence in R&D is not a valid generalization," he declared.

## Mixed Bag

He noted that the government's experience in encouraging "scientific excellence" and "its success with the

aerospace industry to develop technology for the government's own operational activities has been outstanding.

"On the other hand," he continued, "the government's involvement in commercial industrial innovation has been a mixed bag at best."

"Thus, it is not surprising that after a good many years of study of the government's role with respect to commercial innovation, little coherent policy has emerged and a great deal of skepticism surrounds each new proposal for specific government action."

Branscomb went on to say that confidence in the long-term future is "the most essential single requirement" for private investment in innovative development.

He argued that "erratic interventions or changes in the course of government policy, however well intended, are the greatest deterrent to industrial innovation because they escalate an already high risk associated with innovative activities for new business development."

According to Branscomb, there are two sides to the government's role that must be considered in its effort to spur

innovation:

- Improvement in the business climate for innovation.
- Support and encouragement of the kinds of scientific and technological activities upon which innovating enterprises can draw.

He said the first side of the government's role has not been adequately addressed by Congress or the Administration in their efforts to help maintain the primacy of U.S. technology in the world marketplace.

Branscomb, a former director of the National Bureau of Standards, called for "constructive relationships between government, the private sector and universities" in the effort to promote innovation.

# Lessor Suing Lloyd's for Nonpayment

(Continued from Page 45)

"slightly more than \$10 million in claims to date," according to Evans, "[Lloyd's] has just stopped paying the claims and the lines of communication have somehow broken down."

Although Evans speculated that Lloyd's may be having difficulty coordinating the information flow among the 57 underwriters involved, he noted, "Our concern was that [the nonpayments] were doing us irreparable damage."

"We rely very heavily on our integrity and our credibility and when payments of claims aren't made, it cer-

tainly does bespeak to Federal Leasing," he said.

Exclusive of other potential lawsuits that could be filed against Lloyd's by third-party leasing companies, Lloyd's liability against claims could total \$230 million, according to a report prepared for Lloyd's by Toplis and Harding, a prominent English loss adjustment firm.

To cope with the anticipated onslaught of claims, Lloyd's recently appointed the First National Bank of Boston to "provide the appropriate financial and related services in connection with insurances on leased computer equipment." The bank has set up a special division for managing Lloyd's business, including the remarketing of computer equipment, if necessary.

While Federal Leasing hopes First National will eventually give Lloyd's "some direction," according to Evans, until now the bank "has just further added to the confusion."

"In fact, [Lloyd's] is trying to start all over again and that's what makes [the situation] so difficult," Evans maintained.

In contrast to Federal Leasing's experience, Intel Corp. — another company that has acknowledged receiving payment for a number of claims against the "J" policies — has "working relationships with the bank and with the Lloyd's people," according to Gary B. Friedman, board vice-chairman and corporate executive vice-president at Intel.

"We're not anticipating any insurmountable problems that would go to litigation," he said.

While Friedman would not specify the dollar amount of claims Lloyd's has paid so far to Intel, he noted, "[Lloyd's] hasn't not paid any claims that we've submitted to it."

Federal Leasing is awaiting Lloyd's response to its suit and plans to depose Lloyd's lead underwriter, Edward Williams Coutts & Partners, in mid-July.

Federal Leasing recently retained John Doar as chief counsel in the case.

Doar, a New York lawyer, acted as chief counsel to the Watergate Committee for Impeachment of President Nixon.

Lloyd's could not be reached for comment prior to press time.

## Executive Corner

- Douglas R. Yarrow has been appointed director of Asia/Pacific marketing for Informatics, Inc.'s International Sales Division. The firm has also appointed Robert S. McCormick as director of legal systems for the company's Legal Information Services Division.

- William L. Bauer has been named manager of new business development at Kybe Corp.

- William R. Hogan has been named systems manager of development architecture for GTE Data Services' Telephone Systems Group.

- Philip W. Shires has been appointed vice-president of sales and marketing for Lear Siegler, Inc.'s Data Products Division.

- Robert M. Knox has been elected a director and named president of Utility/Energy Systems, Inc. E. James Angelo was named vice-president and technical director.

- Harold H. Rumph has been promoted to vice-president of marketing of Harris Corp.'s Data Communications Division. Roy R. Solaski has been elected vice-president of human resources.

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Aramco, the principal oil company developing the energy resources of Saudi Arabia, is involved in projects that are staggering in scope, complexity and inventiveness. We're committed to applying process computer systems to all areas, and that's why we need some very talented process computer specialists.

If you have the experience we need, and you're interested in an increase in income of up to 40%, plus very attractive travel opportunities in Europe, Africa and Asia, keep reading.

**We'll pay more because you're worth more**

You can earn up to 40% more tax-protected income with Aramco in Saudi Arabia because your skills are worth more to us. Here's what we need:

We require process computer software engineers with BS degrees in engineering, math or computer sci-

ences, and 3 to 5 years' experience in various real-time processes or SCADA projects.

We also need process engineers with BS degrees in chemical engineering and 3 to 5 years' experience in computer applications of plant process control.

Process computer hardware systems engineers are needed with BS degrees in electrical engineering, computer science or engineering technology—plus 3 to 5 years' experience in designing and maintaining process computer and instrumentation systems.

**Work in U.S., Saudi Arabia or in both**

If you do come to work for Aramco, you'll have several options. You could work in the U.S. with vendors developing hardware and software for our

overseas projects; and then spend time overseas interfacing between Aramco and the vendors when the equipment is installed. Depending on our needs and your career development, you could also work exclusively for us in the U.S., or spend time in both countries. As the challenges develop you'll have a choice. Of course, only overseas employment qualifies for the 40% extra income and the 40-day paid vacation. **There's a lot more than money and travel**

If you have a family, you'll be interested in learning about the exceptional educational facilities Aramco offers your children. We also pay transportation and travel expenses for your entire family to the States and back every year. You will have 40 days' paid vacation every 12½ months in Saudi Arabia—plenty of time to make economical trips to Europe, Asia and Africa.

Think about the interesting job, the extra income and the travel opportunities available in Saudi Arabia. And about the opportunities for career development if you work for Aramco in the U.S. If you're interested, call Jerry Hollingshead for an application, or send your resume in confidence to: Aramco Services Company, Department CW070979A, 1100 Milam Building, Houston, Texas 77002. Call toll-free: 1-800-231-7577, ext. 4114. In Texas, call collect: (713) 651-4114.



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group

## Programmer /Analyst

**\$18 — \$30K**

**San Francisco  
Bay Area**

Several of our Bay Area clients have immediate openings for large scale IBM Programmer/Analysts with a minimum of 2 years experience in COBOL, ALC or PL/I. The individuals we seek should have Financial, Manufacturing or Retail applications experience. Our clients offer excellent salaries and benefit packages.

We are consultants to management. For confidential consideration, please send resume and salary history to Amy Kraus; Professionals for Computing, Inc., One Maritime Plaza, Suite 1350, San Francisco, Calif. 94111. (415) 956-7120. Employer assumes fee.

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## SYSTEMS ANALYST

Expanding oil & gas company seeks individual having at least 3 yrs. experience in COBOL and systems design on IBM equipment.

Systems development will be interactive through 3278 CRT's. Program development will support multiple locations in Texas and California. All systems will utilize the DBMS ADABAS from software AG. Hardware consists of a 370/148 2 MEG machine running OS/VS1.

The merger of several companies has created a groundfloor opportunity for those candidates who have demonstrated an ability to function and progress in this environment. We offer competitive salaries and excellent company paid benefits including health, dental, life, retirement, disability. Qualified applicants send resume & salary history in confidence to Personnel Department.



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Professional Technicians offers you, the talented professional, the best of career opportunities. With headquarters in Southfield, Michigan, we have a national corporate structure, a nationwide customer base, and plans for continued growth and expansion. As part of our planned expansion, we recently opened a regional office in Houston, Texas. Additional regional offices in Boston and Chicago will be established by the 4th quarter of this year. Since we serve some of the largest organizations in the world in various capacities of data processing, we can provide our specialists numerous opportunities for personal and professional growth.

## The Contract Hiring Program

This program, which is an effective and unique concept, provides you with the option to ultimately become a permanent employee of one of our customers. Through the Contract Hire Program, we provide our customers with the service of top professionals. At the same time, the program allows our Contract Hire employees the opportunity to evaluate whether or not their career objectives will be achieved with the assigned customer. In other words, you may exercise the option to join the customer at the end of the assignment or remain with the Professional Technicians permanent staff.

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For those who enjoy a diversity of challenges in different environments, we offer a wide range of assignments in our Contract Services program. You will be a permanent member of our team of top professionals working on a variety of projects with one or more of our customers in developing solutions to their data processing problems. You may be working in one of the following areas: educational, consulting, application development, systems software development, or any one of a variety of other areas depending on your particular talents.

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We prefer experienced professionals, but we will train creative and innovative individuals with promise. We are looking for individuals with the following experience:

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- Performance Measurement • Data Base
- Network Analysis • Programmer/Analysts

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Our exclusive client, a well established Local Manufacturer of Minicomputer and Microprocessor based Terminal Products, seeks Software and Programming Professionals to begin immediate work on Development of Major New Customer Generated Applications Systems. Numerous assignments exist in two major project areas for Senior Programmers, and less experienced personnel:

**PROJECT...** REAL-TIME Applications Development for ON-LINE DATA BASE Management System, using "MENU" Format for CRT Display.

**REQUIREMENTS...** Minimum one [1] year of experience in ASSEMBLY LANGUAGE Programming for any Minicomputer DEC PDP-8 experience a plus, but not required.

**PROJECT...** REAL-TIME Applications Development (New Feature Development) for ECLIPSE/MICRONOVA Based POINT-OF-SALE systems.

**REQUIREMENTS...** Minimum one [1] year of experience in FORTRAN or ASSEMBLY LANGUAGE Programming. Experience with DATA GENERAL NOVA, MICRONOVA, or ECLIPSE Systems and knowledge of RDOS or RTOS a plus.

Compensation for the above positions is open, based upon experience. Client company provides Excellent benefit program and Advancement potential. IMMEDIATE COMPANY INTERVIEWS WITH HIRING MANAGERS WILL BE PROVIDED FOR QUALIFIED APPLICANTS, who are urged to contact Mr. Robert Kleven-in strict confidence-at (617) 861-1020, or to submit current resume to him for confidential review. Client company assumes all fees and Interview Expenses, and is an Equal Opportunity Employer.

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Prefer degree in Math, CS or EE and 2-5 years experience in real-time microprocessor based systems.

### MICROPROCESSOR DESIGN ENGINEERS

BSEE with 2-5 years experience in design and development. Firmware programming experience desirable.



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## Sr. Software Engineer

San Francisco Peninsula

Ford Aerospace & Communications Corporation, located in Palo Alto, California, has an outstanding opportunity for an individual with an applicable degree (or equivalent) and 5 to 6 years' project management experience in the design and development of minicomputer and microprocessor software packages to support electronic system requirements. Experience with operating systems is required. Language facility must include machine, assembly and FORTRAN.

If you're ready for plenty of challenge and responsibility, join us now and enjoy an outstanding benefits package including •Ford car purchasing plan •12 paid holidays including paid Christmas shutdown •Credit Union •Tuition assistance •100% company-paid medical and dental insurance premium for both employee AND dependents.

Interested? Then make your move now. For immediate consideration, please send your resume to Professional Employment, Dept. CK-83, or call toll free (800) 227-8386 (within California, call (800) 982-5853).



**Ford Aerospace & Communications Corporation**

Western Development Laboratories Division

3939 Fabian Way, Palo Alto, California 94303

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# Here are 14 good reasons for living in the San Francisco Bay Area:



**1. Wine Tasting  
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Country 2. Marriott's Great  
America 3. The  
Antique Shops of**

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kin Festival 5. Towering  
Redwood Forests  
6. The Monterey  
Jazz Festival 7.  
Golden Gate Park  
8. Camping in  
Yosemite 9. The  
Great Restaurants  
of San Francisco 10. Sailing from**



**Sausalito 11. Skiing at Lake  
Tahoe 12. The Beach  
and Boardwalk  
at Santa Cruz 13.  
Fisherman's Wharf  
14. Marine World/  
Africa USA.**



# Here's 1 great reason for living in the San Francisco Bay Area:

**1.** Optimum Systems Incorporated. A great reason to live here because it's a great place for Data Processing Professionals to pursue challenging, rewarding careers.

Combining a warm, friendly atmosphere with a highly creative, highly professional working environment, OSI is one of the nation's top computer services firms. From Health Care and Finance to Manufacturing and Government, our diverse applications and wide customer base will provide you with the optimum in opportunity, growth and advancement.

Consider pursuing one of these excellent opportunities with the leader in computer services—in one of the most livable places in the world.

## Programmer/Analysts

BS Bus/CS or equivalent, 2-5 years experience in COBOL and OS JCL; MVS, IMS and ALC experience desirable. BOM and Manufacturing Systems a plus.

## Systems Programmers

Intermediate thru Senior levels, BS/BA or equivalent plus 3-9 years of systems programming experience. VSAM, CICS/VS, MVS-JES 2 Internals, VM, and tuning experience highly desirable.

## Marketing Representatives

2-5 years experience in Data or Services area and/or related EDP experience.

## Systems Analysts

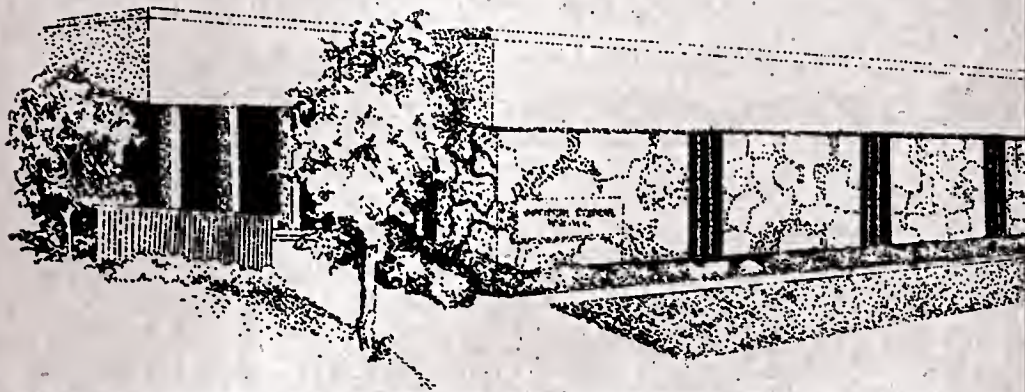
BS Bus/CS or equivalent, 2 years as a systems analyst, preferably in a health care environment.

## Corporate/Branch Systems Engineers

BA/BS or equivalent, 3-5 years experience in DP systems, programming and analysis. Familiarity with IBM hardware, MVT or IMVS, OS, COBOL, Assembler, Data Base, PL/1, JCL, Utilities and well versed in Interactive Systems. A technical challenge with extensive customer interface.

Excellent opportunities also exist for Production Control Analysts, Senior Operators, Project Managers, and a variety of openings in major metropolitan areas coast to coast.

OSI offers excellent salaries and an outstanding benefits package, including life, medical/dental and disability insurance, tuition reimbursement, and more. Most of all, we offer an exciting opportunity to become part of a highly professional staff of specialists in a sophisticated, state-of-the-art environment (IBM 3033, 370/165) with unlimited career potential.



Please send your resume, with salary history, in complete confidence to Madison Shelby, Optimum Systems Incorporated, 2775 Northwestern Parkway, Santa Clara, CA 95051, or call (408) 987-4444. We are an Equal Opportunity/Affirmative Action Employer, m/f/h.

## Optimum Systems Incorporated

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## Technical Writers Lead Positions in Austin, Texas

Live in sunny Austin, Texas, an area noted for its lakes and year-round recreational activity. With its clean air, low taxes, and lack of urban congestion, Austin is ranked as one of the ten most liveable cities in the United States. Texas Instruments' rapidly expanding computer product facility in Austin, Texas, needs qualified, experienced software technical writers to assume lead writer responsibilities.

### Computer Software Writers

Coordinate, research and write computer programmer guides, users' manuals, etc. from development data and personal interviews. Must be familiar with operating systems structure and programming languages.

All positions require a college degree (or equivalent experience) and a minimum of 3 years' directly related writing experience. TI offers competitive salaries and a full line of benefits including company-paid relocation.

If you have talent, experience and a keen interest in making the most of your career, we have the challenge and the opportunity for you. Call us now to schedule an interview. Call collect (512) 250-7033 during normal business hours, or send your resume in confidence to: P. O. Box 2909, M.S. 2208/Austin, TX 78769/ Attn: George Noren.

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## SYSTEMS ANALYSTS PROGRAMMERS

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of the  
**80's**

**1980's communications**  
**1970's microelectronics**  
**1960's operating systems**  
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Each decade has had its major challenge in our Industry. In the 1980's, Distributed Processing will come of age; the business world will go On-Line to a far greater extent than ever before. The very heart of distributed processing systems is DATA COMMUNICATIONS. NCR Corporation is stepping up to the challenge with NCR/DNA (Distributed Network Architecture).

NCR/DNA will be applied to major Financial Institution Networks, Retail Networks and Industrial Networks. Engineering and Manufacturing, Columbia has responsibility for the systems design and development of these networks and the COMMUNICATIONS PROCESSORS of which they are composed. Major areas of software development are:

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Synchronous  
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Teletype

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Switching Nodes

### INSTALLATION TOOLS

Network Definition Language  
Configurator/Constructors  
Bring-up Diagnostics

### OPERATING SYSTEMS

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Real-Time  
Applications Interface  
Start-up, Shut-down

### NETWORK SYSTEMS

Packet Switching  
Routing Control  
Global Supervision  
In-Service Diagnostics

### INTER-NETWORK INTERFACES

SNA  
ACS  
X.25

The professionals we are seeking to become part of the CHALLENGE of the 80's should have 3 or more years experience in systems programming and systems analysis. Your experience should be characterized by Systems Design and Assembly Level Programming in one of the following functional areas: Operating Systems Internals, Communications Drivers, Network Control, Language Translators, Applications Access Methods, Real-time Applications, or Diagnostics. However, we are more interested in the quality of your systems experience than in a specific functional fit.

Columbia South Carolina is one of the most attractive sunbelt cities in the U.S. The Atlantic seashore and the Great Smoky Mountains are just two hours drive away, and there are several freshwater lakes within minutes of downtown. Columbia offers an easy lifestyle that includes both city and country living with excellent recreational facilities for tennis, golf, fishing, boating, and swimming. The area also offers excellent housing opportunities, low taxes, and it is the home of the University of South Carolina and other fine educational institutions.

If you would like to be part of the CHALLENGE OF THE 80's with a leader in the industry, in an excellent community, and have the above experience, PLEASE SEND RESUME AND SALARY HISTORY, IN COMPLETE CONFIDENCE, TO: Mr. Ken Uhlig, NCR Corporation, Engineering and Manufacturing Department M50, 3325 Platt Springs Road, West Columbia, SC 29169 or call him COLLECT at: (803) 796-9250.

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If you're a data processing professional in MIS, Fairchild is your company—for so many reasons.

First, we'll give you the opportunity to work at the forefront of your discipline with a company fully committed to MIS and ISP methodology. We're leading participants in the information revolution!

Second, we have all the latest hardware including the IBM 370/168 MVS, 168 VM, 3850 mass storage subsystem, 3800 printers, IMS, TSO, distributed processing, and worldwide telecommunications. In August we will install a new IBM 3033 MVS.

Third, we offer top salaries and excellent benefits—plus a career-oriented environment that offers you room for personal growth.

We currently have openings for bright, energetic people in all areas of our MIS group. One of these may be just right for you.

#### Programmer/Analysts

**Starting salaries from 21-27K**

Experience in designing, implementing and modifying large computer systems and a thorough knowledge of VS/ANSI COBOL and/or Optimizer PL/I, IBM OS/VS JCL and TSO are required. Comprehensive knowledge of the improved programming technologies and basic knowledge of database and on-line system concepts are also needed. Some positions are available with a four-day workweek, Monday-Thursday or Tuesday-Friday. (Those openings appear with an \* below.)

Programmer/Analysts are needed to support these applications areas:

**Sales Analysis & Sales Systems\***  
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**Personnel & Payroll Systems**  
**Manufacturing & Cost Accounting**  
**Post Sales Systems**  
**Production Inventory Systems\***  
**Distributed Applications Projects**  
**Chargeback System**  
**System Resource Reporting**  
**Order Processing Systems**

#### Systems Analysts

**Starting salaries from 24-28K**

Talented individuals interested in project management and in working in a team environment are needed for the areas listed below. You must also have strong written and oral communication skills plus a desire to work in a structured environment using structured development methodologies.

**Financial Planning Systems**  
**Order Processing Systems**  
**Payroll & Personnel Systems**  
**Manufacturing & Cost Accounting Systems**  
**Sales, Accounting & I.R. Systems**

#### Database Consultant (IMS DB/DC)

**Starting salary from 26-30K**

Acting as a consultant with application development/maintenance teams, you must be able to design and implement IMS databases, and define and install procedures for the maintenance of IMS databases to provide reorganization, backup and recovery. Candidates should have experience with a data dictionary (preferably IBM) and the ability to lead a project to install the dictionary and create the standards and procedures to support the dictionary.

#### SDM-70 Administrator

**Starting salary from 24-27K**

A highly qualified, effective communicator is needed to be responsible for the overall control, administration, installation, usage, coordination and monitoring of the MIS System Development Methodology. You will evaluate the SDM-70 product and take appropriate action to ensure MIS phase-in, conduct ongoing training/consulting for all affected personnel, and coordinate/install all enhancements to the product and its related procedures, policies and standards. BS/BA in Business Administration with Computer Science courses plus a minimum of 3 years or equivalent in the following are needed: Systems Development Cycle, Programming (MARK IV, COBOL), IBM System 370 OS/VS compatible equipment and software, and Improved Programming Technologies. Candidates should also have had at least one year as a project leader.

#### Security Consultant

**Starting salary from 26K**

A highly qualified individual is needed to be responsible for identifying, analyzing, developing and finalizing MIS control policies, directives and standards. You will monitor measures to provide a

controlled MIS environment, actively participate and/or lead planning directed at the development of measures affecting MIS groups or remote sites, and perform project leadership. Ideal candidates will have at least 5 years' experience in at least 2 of the following: application systems development using COBOL or PL/I, systems programming or computer operations. You should also have exposure to IBM 370/168 VM or 168/MVS computing systems, TSO or equivalent time sharing capability, and distributed computing using SyFA or equivalent minicomputer systems. Related college degree or equivalent highly desirable.

#### Production Certification Specialist

**Starting salary from 20K**

Administrative and organizational skills are a must for this key position. Responsibilities will include assuring the accuracy of computer programs passing from development to production, adherence to standards, and backup and recovery. Duties will also include providing change control function for modifications, maintaining central program documentation files and performing production installation procedures. Two-plus years of college level coursework or equivalent experience required. Data processing experience, specifically JCL and job scheduling, preferred. Second shift position.

#### Methods and Procedures Analyst

**Starting salary from 22K**

A results-oriented individual with a minimum of two years' experience is needed to work and interface with the user community as a member of one or more project teams. Your responsibilities shall include all phases of developing, improving and documenting computer input/manual procedures. You will write and provide direction in the development of user manuals. Your strengths should lie in: methods and procedures analysis, systems design and planning procedure writing, communications and leadership. The successful candidate will have a Bachelor's Degree or equivalent and a proven success record in the above areas. This position requires manufacturing/marketing or finance experience. A data processing background is helpful.

If you have the qualifications we seek and want to stay at the forefront of the Information Revolution, call Bob Sanford at (415) 962-3570. Or send a resume/letter outlining your background to Dana Tueller, Fairchild Corporate Staffing, MS 7-100, 464 Ellis Street, Mountain View, California 94042.

At Fairchild, we're proud of our efforts as an affirmative action employer and we encourage women, members of minority groups and the handicapped to apply.

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For further information, send resume in confidence to Mr. William Green, or call him collect at our headquarters:

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These services include EDP management consulting, systems analysis and design, programming support and turnkey mini computer business systems. CHC's technical staff has developed and implemented On-Line systems, as well as major commercial batch systems.

On March 12th, 1979, Computer Horizons Corp., opened its newest branch office in Chicago. We would like to continue staffing our new Chicago office, as well as increase our already existing staff in New York,

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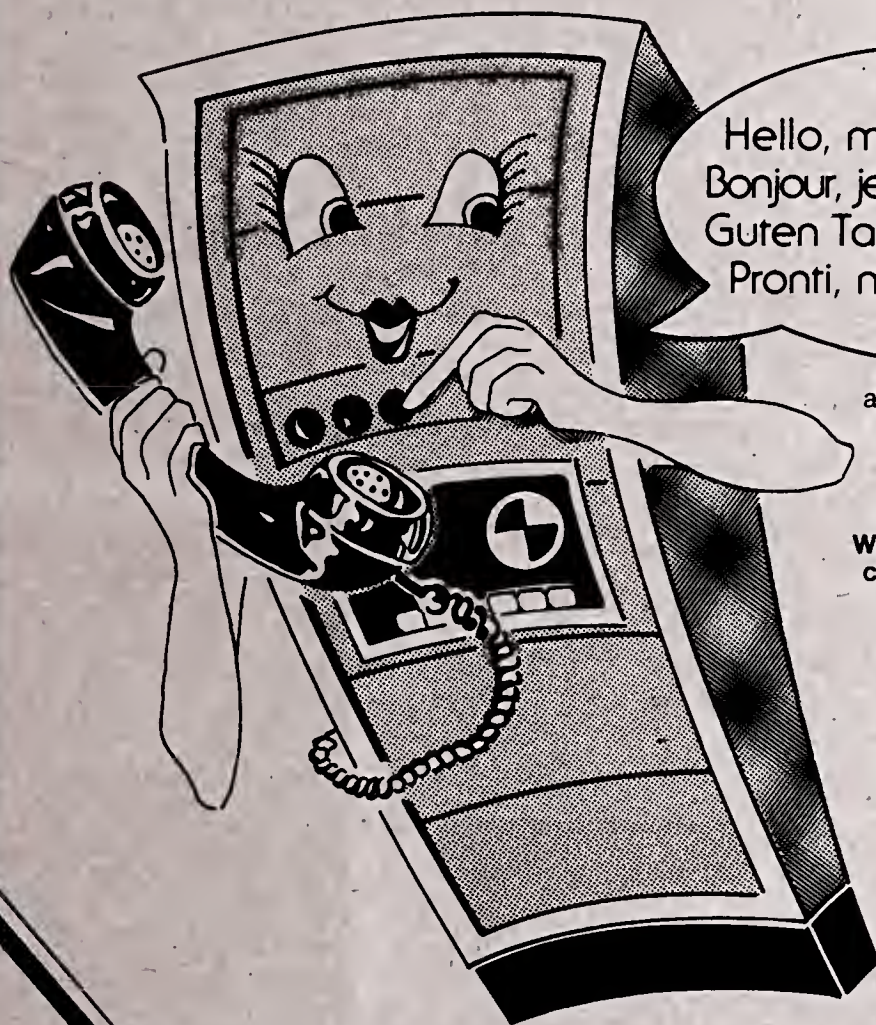
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This position offers a unique challenge for the original development of sophisticated realtime software. Competitive salary and comprehensive fringe benefits.

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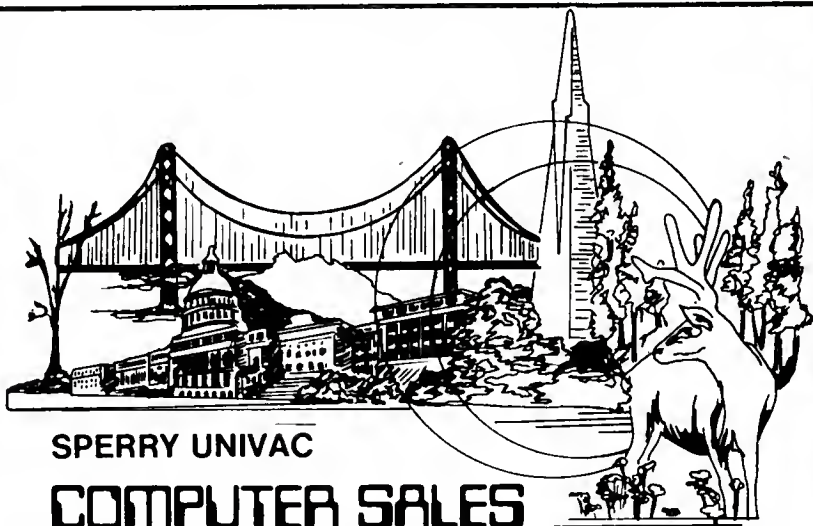
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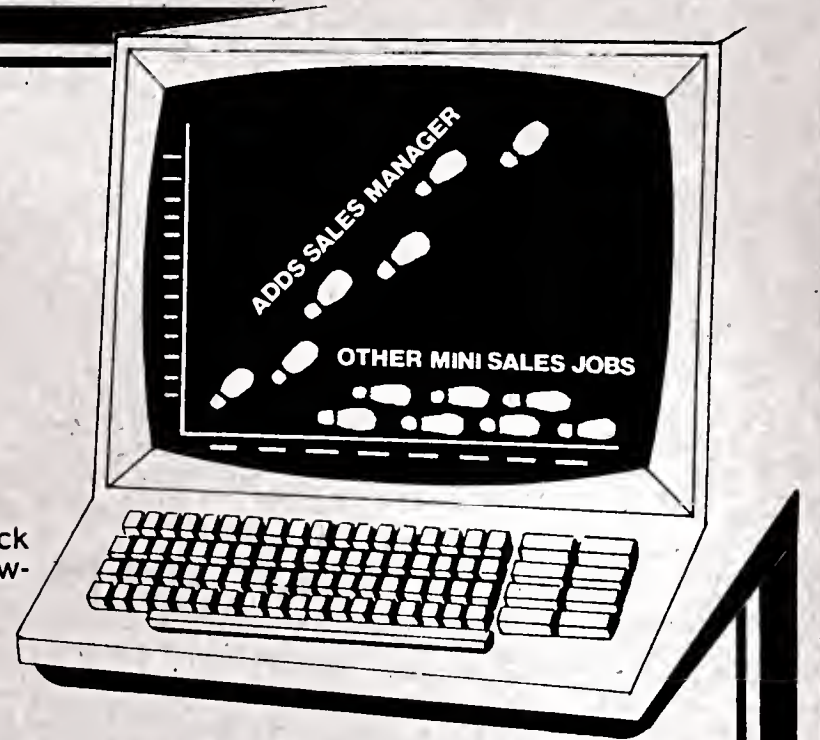
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Take charge individual capable of handling projects from start to finish. Position requires Bachelor's degree and 3-7 years experience with mini computer systems and proficiency in FORTRAN, BASIC a plus. Ideal candidate will have worked in a Manufacturing environment with real-time and time sharing computer systems.  
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SYSTEMS ANALYSIS

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We offer a competitive salary commensurate with your experience and a comprehensive fringe benefit program. We are a leading life and health insurer and this position is located at our headquarters in Cincinnati, one of America's most livable cities. Other than for professional opportunities, the position requires no travel.

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Instructor/Assistant Professor in Computer Science. To teach undergraduate and graduate courses in computer science and to assist in a developing computer science program. Doctorate in computer science and a minimum of two years experience in teaching or appropriate professional experience. Salary commensurate with qualifications and experience. Filling of this position is contingent upon available funding. Deadline for applications: August 10, 1979. Address All Inquiries To: Affirmative Action Officer, Bridgewater State College, Bridgewater, MA 02324. An Equal Opportunity/Affirmative Action Employer.

PROGRAMMER

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PROGRAMMER  
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We are seeking an individual with the ability and experience to deliver systems and program architecture from functional applications. On-line systems, PL-I programming, manufacturing or cost accounting applications experience is a plus.

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You will play a primary role in recommending and implementing hardware and software to support our multi-plant environment. To qualify you should have 2 years experience as a specialist maintaining IBM software components such as DOS/VS, CICS, and DBMS or TP monitor. A BS in math or computer science or equivalent work experience is preferred.

At Precision Castparts you'll be working in a "small shop" environment with "big shop" responsibilities. We offer a starting salary commensurate with experience, ideal working conditions, excellent company benefits and relocation to the desirable Pacific Northwest, complete with ideal lifestyle, and a variety of recreational activities.

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Yakima County is seeking an experienced individual to design and implement complex computer programs on a Univac 90/3D Computer System with teleprocessing. Experience with business systems including payroll/personnel is desirable. Requirements include five years education and/or experience in computer programming or computer systems analysis. Yakima is a modern town with a population of 53,000 located in the beautiful Pacific Northwest. The area is known for its agriculture base and 300 days of sunshine a year. Situated in the eastern foothills of the Cascade Mountains, recreation is at the back door. Send resume to Yakima County Personnel Department, Room 412 Courthouse, Yakima, Wash., 98901 prior to July 27, 1979. "Equal Opportunity Employer"

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**Programmer/Analyst I** — As above, except no supervisory duties. Two or more years significant experience required. Salary range — \$15,540.00 to \$19,848.00 annually.

Send resume and salary history to:

**Boise City Personnel Department**  
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Using a combination of individual attention from professional counselors with the hi-speed efficiency of computer technology, your resume is reviewed, coded and put into our computer's memory system. There, it is continuously checked by companies seeking persons with your qualifications. Your counselor will advise you when a "match" occurs, but you are under no obligation to interview if you are not interested. Your identity remains a coded secret until an interview is mutually agreed upon.

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Exclusively employer retained EDP recruiters. All major cities. For information regarding these available positions, send your resume with current salary and geographical preferences to National Headquarters, Data Processing Recruiters, Inc., 322 Groveland Avenue, Minneapolis, Minnesota 55403. For franchise or network partnership information, contact Mr. T.G. Barrett, President.

CAREER OPPORTUNITY IN DENVER

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We design and market the AD/380 Automated Design and Drafting System, \* a refined combination of hardware and software that facilitates all standard drafting functions and engineering designs.

Programmer Analyst

Need qualified applicant to analyze user requirements and write and test programs and assist with user training. Requires 4 to 6 years programming experience and bachelor of science degree in data processing math or scientific disciplines.

The position is in the newly created Corporate Data Processing Department. Material Requirement Planning (MRP) experience is a definite plus. Other accounting applications will also be developed. COBOL is the preferred experience.

Our company is twenty years old with sales and service offices throughout North America and overseas.

This position offers excellent starting salary, liberal benefits package including relocation reimbursement, profit sharing, and advancement opportunity.

Qualified candidate send complete resume with salary history in confidence to: MR. JOHN LOVEJOY.

Auto-trol Auto-trol Technology Corporation 5650 N. Pecos St., Denver, Colo. 80221 (303) 458-5900 An Equal Opportunity Employer M/F/H/V PROGRAMMER ANALYST

Data Processing

Advanced Micro Devices is a \$150 million company at the forefront of the semiconductor industry. Because our Data Processing group is central to our continuing growth, we have immediate openings for:

Systems Analysts

You will analyze, design and implement Business Applications on medium size systems hardware, maintain flow charts and other systems documentation, and provide interaction with users of M.I.S. services.

Ideal candidates will have 3 years' COBOL programming and/or distributed processing experience, and a minimum of 2 years systems analysis experience in manufacturing, accounting, and/or administrative applications. Bachelor's degree in Business, Engineering or Computer Science required; MBA a plus.

Programmer

Four-year degree preferred, with 2-3 years COBOL programming experience.

We offer a challenge for further professional growth, and an excellent company benefits program.

For immediate consideration, please call (408) 732-2400 or send your resume to:

Frank Goudaillier, Advanced Micro Devices, 901 Thompson Pl. Sunnyvale, Ca. 94086.

Equal opportunity employer M/F/H

ADVANCED MICRO DEVICES

EDP Professionals

PROJECT LEADER PROGRAMMER ANALYSTS

Minimum of B.S. degree. Experienced in Administrative System Analysis, design and implementation. Knowledge of 370/168, VM, COBOL, JCL, HASP and CMS desirable. Excellent benefits include: liberal vacation policy, tuition refund and health insurance.

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## PROGRAMMERS/ANALYSTS

At Valley National Bank we have a sense of pride in our growth and our state. This sense of pride is carried on in the work our 6,000+ employees do for us. Our growth is measured by the success of the people who are Valley National Bank... our employees.

IBM 370/158 & 168, OS/MVS COBOL &/or ALC

PROGRAMMERS/ANALYSTS - Bank Applications

2+ years experience programming: DDA, TDA, ILS, CLS, R/E, Charge Card, Personal Trust (Trustor II is a plus), or Investments.

PROGRAMMERS/ANALYSTS - Mini Systems

To work on PRIME 400 & 750 in a time-sharing environment. Require 2 years experience on PRIME minicomputer using PRIMOS, MIDAS, & POWER.

Experience with DEC PDP 11/34. Need Data Communications & familiarity with RS-11M.

Various other positions are to be opened due to staff increases: Data Base/Data Communications, Hardware Evaluation, Software & Operations.

If you are looking for OPPORTUNITY FOR GROWTH, please send your resume with salary history to the address below or call S. Felsch collect (602) 261-1699.

(NO AGENCIES PLEASE!)

VALLEY NATIONAL BANK  
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Phoenix, AZ 85001

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Valley National Bank of Arizona

## PROGRAMMER DEC RST/E PDP11

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## POSITIONS NATIONWIDE CALL TOLL FREE 800-426-0342

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Bausch & Lomb, a leader in the manufacture of quality consumer products and scientific instruments, is currently seeking candidates to fill a new position in one of our major divisions, located in Rochester, New York. Candidates must possess a BS degree in Computer Science or Accounting and a minimum of five years' experience in a manufacturing environment. Ideally, professional experience would have included the elements of standard cost accounting related to the manufacturing and assembling of scientific optical products.

Reporting directly to the Division Controller, overall responsibilities will include the coordination and development of manufacturing-related systems. Prior experience with work-in-process and material requirements planning (MRP) systems is considered essential.

If a position that offers high visibility and growth potential, while contributing to the overall effectiveness of a major division of a \$440 million corporation meets with your career objectives, we'd like to hear from you. Please forward your resume, including salary history, in confidence, to:

Mr. Donald W. Lewis,  
Senior Corporate Recruiter

BAUSCH & LOMB

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For professional and geographic fulfillment, the Sunbelt is where it's at. Enjoy a challenging work environment in "State of the Art" installations and, in your leisure time, enjoy a life-style that blends with a temperate climate. Our Fortune 500 clients are seeking qualified EDP professionals with a minimum of one (1) year experience in an IBM environment. Client companies assume all fees including interviewing and relocations costs. Please send your resume in CONFIDENCE OR CALL TOLL FREE 1-800-821-2280 X 804 (in Mo. 1-800-892-7655 X 804).

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|---------------------------------------|----------|
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| Data Base Analyst(s)                  | \$28K    |
| Sr. IMS Systems Prog(s)               | \$28K    |
| IMS Systems Prog(s)                   | \$26K    |
| APPLICATIONS:                         | TO       |
| Project Leaders IMS/VS,MFG,COBOL      | \$28K    |
| Project Leaders MFG                   | \$26K    |
| Sr. Systems Analyst(s) IMS/VS,COBOL   | \$25K    |
| Systems Analyst(s) CICS MFG/Financial | \$24K    |
| Programmer/Analyst(s) IMS/VS          | \$24K    |
| Programmer/Analyst(s) COBOL/ALC       | \$22K    |
| Programmer(s) COBOL/ALC,DOS/OS        | \$14-20K |
| TECHNICAL SUPPORT                     | TO       |
| Sr. Systems Prog(s) MVS-SYSGENS       | \$30K    |
| Systems Prog(s) OS:SVS-MVT SYSGENS    | \$26K    |
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CONTACT BILL DENNY/JIM KING

Jim King and Associates

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## SYSTEM/SOFTWARE PROFESSIONAL

Itel Corporation's Bank Data Services Division, one of the nation's major national banking firms, has a ground-level opportunity for you in our new Boston data center. We're looking for an experienced data processing professional with the following qualifications:

### Programmer/Analyst

- to work with a major on-line data base banking system, large IBM 370 computers and mini-computers.
- responsibilities include project analysis customer interface and systems development.
- 3-5 years' COBOL experience.
- BAL a plus.

Itel offers excellent salaries commensurate with experience and an outstanding benefits package including tuition reimbursement.

If you're interested in a challenging future and the opportunity to become a part of one of the nation's fastest-growing data service companies, send a resume in confidence to:

Itel Corporation, Bank Data Services Division, Technical Director, 3 Corporate Park Drive, White Plains, N.Y. 10604. An equal opportunity employer.

M/F/H

ITEL

Bank Data Services Division

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Excellent opportunity for candidate with at least two years experience in a business or government environment. Background in RPG II and/or ANS COBOL required. Exposure to IBM System/3 Model 15D and CCP desirable. Send resume with full details including salary history to:

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Canyon County  
1115 Albany Street  
Caldwell, Idaho 83605  
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### LEGISLATIVE ADP SYSTEM

Coordinate development of computerized bill processing and statute retrieval system for State legislature. Bachelors degree or equivalent with experience in systems design, programming, operation of modern data processing techniques, supervision, and administration. Ability to develop detailed plans for implementation of ADP system. Understanding of legislative process beneficial. Salary commensurate with experience, excellent benefit program. Resume by July 31, 1979 to CW Box 1991, 797 Washington St., Newton, MA. 02160.

## PROGRAMMERS/ANALYSTS

Atlanta based major financial institution seeks experienced COBOL Programmers and Analysts. Two or more years' experience required. Data Base and Data Communications experience helpful but not required. Attractive benefit package. Salary commensurate with experience. Send resume and salary history in confidence to:

Recruiter  
P.O. Box 312  
Atlanta, GA 30301

## PROGRAMMER/ANALYST WEST CHICAGO SUBURB.

Art supplies mfg. now seeking applicant w/1-3 yrs. exper. on DEC-PDP-11 (RSTS/E) using BASIC-PLUS for business applic. Knowledge of acctg. and mfg. a MUST. BA or AA in Business or C/S helpful. Salary mid-to-upper teens. Send resume w/salary req. or contact: John Muller

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The Architecture Team of Zilog's Component Division is looking for a Computer Architect to help maintain the leadership role represented by the Z8000 and Z8 Microprocessors. If you are the right person, you will help define additions to the Z8000/Z8 family and will work on the architecture of future product lines.

You must have a strong background in Computer Architecture and a desire to work on the whole range of Component Architecture problems. Familiarity with or expertise in any of the following will be a definite plus:

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We offer excellent salaries, comprehensive benefits and unlimited growth potential. And, as the ultimate incentive, a chance to stimulate your mind in a way you never thought possible.

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LARGE, MODERN, TECHNICALLY SOPHISTICATED CLIENTS located in the SUNSHINE STATE have requirements for PROGRAMMER ANALYSTS, SYSTEMS ANALYSTS and DATA BASE SPECIALISTS who have experience in ANY of the following areas: IBM, CICS, IMS, COBOL, or ASSEMBLY LANGUAGE. Please submit RESUME including SALARY HISTORY or CALL:

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## Software Engineer

Lead the development of new sections of an existing microprocessor based operating system. Create functional and design specifications, design, code, test, and maintain operating system components. Responsible for evaluating task complexity, establishing schedules, and status reports.

BCS plus 2 to 3 years experience with assembly language programming, preferably with microprocessors. Knowledge of operating system design required.

Tektronix, Inc., develops, manufactures and markets internationally recognized precision electronic instrumentation. Headquartered near Portland, Oregon and supported by sales and service professionals throughout the U.S., we are within a two hour drive of the Cascade Mountains and Ocean Beaches. The close-by natural playgrounds and the City of Portland provide a variety of recreational and cultural interests.

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Send detailed resume and salary history to Mary Walhood, Tektronix, Inc., P.O. Box 500, E-28, Beaverton, Oregon 97077, or call toll free 1-800-547-1164.

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Fla. State Univ. is recruiting applicants for the following positions:

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Requires a Master's degree in computer related area and three yrs. of systems and/or applications experience. Duties will include implementing, maintaining and enhancing CICS-VS data communications monitor software under VTAM and MVS; and coordinating applications development for CICS-VS. CICS-VS applications background in COBOL and PL/I will be favorably considered.

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Requires Bachelor's degree with graduate training in statistical methods, ed. research, math. or information science and three yrs. of experience in the education field including OS JCL exp. Works in conjunction with the Fla. Dept. of Educ. in the conversion of their DOS workload to the NWRDC (data center) using UCC TWO (DUO) with JCL conversion. Move toward DBMS to occur on selected applications.

Interested persons may contact Florida State University Personnel, 216 SWA, Tallahassee, FL 32306. Equal Opportunity Employer.

National Oceanic and Atmospheric Administration announces Senior Executive Service position vacancy of Deputy Assistant Administrator for Management and Budget. Candidates must demonstrate effective experience supervising large organization, including EEO efforts. Responsibilities of the office include providing resources management support to Federal Agency of 14,000 employees with nationwide facilities and a budget in excess of \$900 million. Services managed include personnel, computer systems, finance, procurement, grants, facilities, supply, etc. Inquire for detailed information by writing: NOAA Personnel, 6001 Executive Blvd., Rockville, Maryland 20852, Attn: Beverly Stevens, or call (301) 443-8373 no later than August 17, 1979. Department of Commerce is an Equal Opportunity Employer.

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Call Collect, or send Resume to:

Mr. Daniel J. Healy  
THE TOUCHETTE CORP.  
5701 Enterprise Parkway  
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(315) 445-0291

### PROGRAMMER/ANALYSTS

Our Company (Based in Tempe, Arizona) is Looking for Data Processing Professionals Interested in a Full Time Permanent Position in Software Development or Systems/Programming Consulting.

Positions Available in Arizona and New Mexico. These Persons Should Possess One or More of the Following Qualifications:

Languages: Cobol, Basic, Basic Plus, Assembly  
Environment: IBM 370 OS/VS, Burroughs 4800, Data General, Wang, Univac, Digital Equipment, Honeywell.

Applications: Financial, Mini-Computers.

We Offer Competitive Benefits and Salary. Interested Professionals Should Contact or Send Resume To:

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Attn: Chuck Thomas  
Director of Contract Services



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We are actively seeking Programmer/Analysts with at least one year experience in IBM, OS COBOL and 6 months experience with IMS. These positions are in the Dallas, Fort Worth, Texas area and involve the development of a state-of-the-art on-line manufacturing reporting system.

Our opportunities are unequalled if you enjoy client contact and aspire to diversified career development. We also offer paid overtime and a comprehensive benefits package. Send your resume in confidence to:

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PMI WESTERN DIVISION

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## Deloitte Haskins+Sells

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Continuing expansion of our New York area Consulting practice has created openings for highly skilled professionals. These are all Senior level positions and offer growth opportunities in a stimulating professional environment.

#### MINICOMPUTER CONSULTANTS

3-5 years of experience in the design and installation of small and medium size interactive computer systems.

#### ACCOUNTING SYSTEMS CONSULTANTS

Significant experience in the design and installation of computerized accounting and control systems, primarily in a manufacturing environment.

#### EDP CONSULTANTS

Minimum of 5 years hands-on experience in feasibility studies, hardware & software evaluation, systems design and installation, and effectiveness reviews.

#### FINANCIAL MODELING CONSULTANTS

Background in quantitative analysis, O.R., and M.S. techniques as applied to business opportunities. Experience in installing computerized financial models required.

All positions require appropriate degrees and experience. Send resume, including salary history, in complete confidence to:

CHARLES P. McLARNON, PARTNER  
2 BROADWAY  
NEW YORK, NEW YORK 10004  
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Manufacturing Data Systems Incorporated

## MANUFACTURING DATA SYSTEMS INCORPORATED

### Research and Development Division Pascal Development

The R & D Division of MDSI is looking for several key people to develop a PASCAL compiler system targeting on multiple machines. Applicants should have a degree in Computer Science or equivalent, and should have played a significant role in the development of at least one production compiler system. Experience with compilers for block-structured languages and PASCAL programming are both pluses.

We offer excellent compensation and career potential in an environment where the state-of-the-art is both advanced and transferred to commercial applications. Interested candidates should send their resumes in strict confidence or call:

B. Baker  
(313) 995-6035

Manufacturing Data Systems Incorporated

4251 Plymouth Road  
Ann Arbor, Michigan 48105

**MDSI**

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### DIRECTOR INFORMATION SERVICES

Immediate opening. Complete responsibility for data processing and information services with a major division of a Fortune 100 company.

Converting from IBM System 3/Mod 150 CCP to IBM System 4331 CICS. Thereafter will implement all applications under COBOL and data base. Ideal candidate is currently employed in an IBM 370 shop using COBOL and CICS, experience with IBM System 3 and RPG II helpful. Position requires solid experience in managing systems analysis and programming functions. Oil industry experience beneficial.

Charter Marketing Company is headquartered about 45 miles from the center of New Orleans and 35 miles from the center of Baton Rouge.

Qualified candidates send resume and earnings history to Vice President Administration, Charter Marketing Company, Post Office Box 1000, Hammond, LA 70404.



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# SYSTEMS PROGRAMMERS

## Tell Us What You Want

National CSS is one of the few companies in the country that can offer you everything you are looking for in terms of location, work environment, technical positioning, freedom, and personal/professional growth.

### LOCATION:

Close enough to major cities to allow you to avail yourself of their advantages without having to live with their disadvantages, such as taxes and crowds; surrounded by educational and cultural centers, in close proximity to beaches, lakes, and mountains.

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Small teams of professionals consisting of some of the brightest and most creative individuals in the industry; flexible working hours; the opportunity, if you require it, of having a terminal in your home.

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National CSS is on the leading edge of the information processing industry, exhibiting consistent innovation in the areas of remote computing, super minicomputers, and database products.

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It may sound like a small point, but with us it's very important — you are an individual, not a badge number, and deserve to be treated as an individual.

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You have the opportunity of selecting a purely technical or managerial career path, with significant opportunity for growth on either path.

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**nt** northern  
telecom

## SOFTWARE OPPORTUNITIES

DANRAY, a Division of Northern Telecom and a manufacturer of highly advanced computerized telephone switching systems, has several software opportunities.

We are looking for real-time assembly language programmers who have a BS degree in computer related field or equivalent experience.

Software projects are developed on sophisticated test beds and include, advanced switching techniques, voice recognition, and new product development. Our plant environment reflects our suburban location.

We offer excellent benefits and a competitive starting salary.

Please send your resume in confidence to Ken Judson or call (214) 234-5001 to inquire about these positions.

**DANRAY**

1201 East Arapaho Road  
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**DANRAY**  
DIVISION

## Director of Data Processing

This is a senior administrative position with responsibility for administrative computing services for Southern Illinois University at Edwardsville. The computer system includes an IBM 370/145 operating under OS/VS1 with a teleprocessing monitor and data base manager. Qualifications include demonstrated managerial capability, planning and budgeting expertise, a knowledge of hardware, software and applications. Experience in a university environment is preferred, but is not required. Salary: open, liberal fringe benefits. Application deadline: August 1, 1979.

As an affirmative action employer, SIUE offers equal employment opportunity without regard to race, color, creed or religion, age, sex, national origin, or handicap.

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Excellent career opportunity with this prestigious CPA Firm. 2+ years BAL systems programming (internals) DOS/VS. Evaluate possible migration to OS while implementing new data base. Outstanding growth possible for technical professional. \$30,000.

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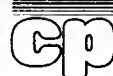
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Seeking sales and sales support personnel for computer software.

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Candidates must be mature, self-motivated and must have demonstrated experience in selling computer software and/or in providing consulting assistance in the data processing area. Experience with Data Base Management Systems, report writers, and/or teleprocessing systems, is considered a positive factor. The ability to communicate effectively orally and in writing is a requirement.

### Compensation

Competitive salary plus significant performance incentives and excellent benefits.

### Location

Openings in Princeton, New York, Chicago, Los Angeles, Houston, and Washington, D.C.

For prompt consideration and a local interview send resume with salary history in complete confidence to Dept. P303.

## MATHEMATICA PRODUCTS GROUP

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# ACP

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Opportunities for talented professionals in the installation and long term development of an ACP-based system. VM, OS/VS1, DOS/VS on 4341's.

We are a people-oriented Company with definite career opportunities offering attractive salaries and benefits, including Company-paid relocation expenses, attractive vacation policies, tuition reimbursement, stock purchase plan, in-house education and training, and other benefits.

We are located in a city of 140,000 people on the Ohio River, with a metropolitan area population of 250,000, enjoying a comfortable lifestyle. All types of sporting and cultural activities are available in the immediate surrounding area and St. Louis, Indianapolis, Louisville, Nashville and Cincinnati are all within a 4 hour or less drive from Evansville.

If you are interested in joining our team, please send a resume to Vice President, Data Processing.

**CREDITRIFT  
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601 N. W. SECOND STREET  
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DRILCO, Division of Smith International Inc., a world leader in the manufacture of downhole drilling equipment, is seeking the following individuals to join us in our growth:

## DATA ADMINISTRATOR

This manufacturing firm located in North Houston needs a proven performer with 5 years experience in the use of IBM and Data Dictionary. CICS exposure in OS environment with a 4 year degree in computer science. — 25K

## SENIOR SYSTEMS PROGRAMMER

Responsible for system software on S/370-158 mainframe and will be responsible for the migration from a DOS/VS to an OS/VS environment.

Experience with VM and DOS/VS operating systems highly desirable. Knowledge of DL/I, CICS and RJE techniques will also be meaningful

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**SMITH DRILCO**

Division of Smith International, Inc.  
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## DIRECTOR OF MANAGEMENT SYSTEMS

The University of Missouri is seeking a Director of Management Systems. Responsibilities include the supervision of approximately 30 professional staff who specify, design, develop, and implement administrative data processing systems. This position is oriented more toward planning and management functions than to the technical aspects of computing. Successful candidates must have an outstanding record of accomplishment in a significant administrative responsibility that includes the activities listed above, preferably in a University computing center. Specific requirements include a Master's degree in Business Administration, Computer Science, Engineering or a related area. Nine or more years of management experience in computer systems design and development.

APPLICATIONS MUST BE RECEIVED BY JULY 20, 1979. Send resume to:

University of Missouri  
Personnel Services  
309 Hitt Street  
Columbia, MO 65211

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# TEXAS!

## SYSTEMS SOFTWARE PROGRAMMER

Our growing Computer Service organization is upgrading from UNIVAC 1110 system to UNIVAC 1100/80 system by early 1980.

If you have knowledge and experience in:

- Operating Systems
- Data Communications networks and terminals
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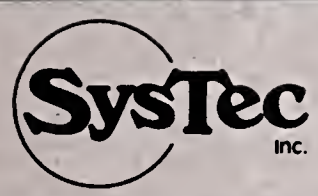
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Personnel Department

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Experience must include a minimum of 3 years in systems and programming. Should be knowledgeable in systems design, EDP control considerations, ANS, COBOL, OS, etc. B.S. or B.A. required. Teaching experience is a definite asset.

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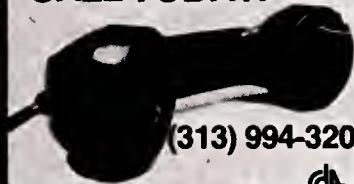
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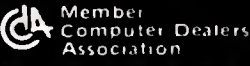
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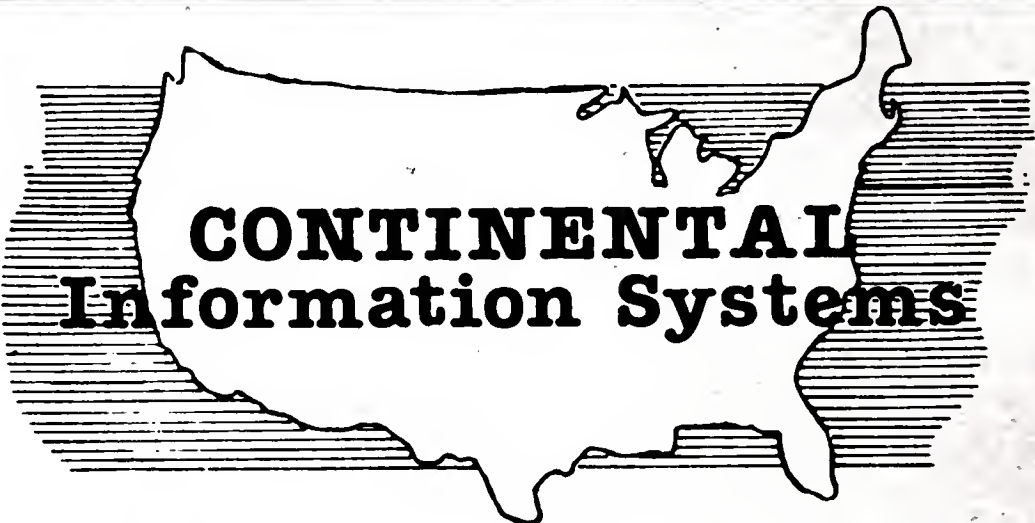
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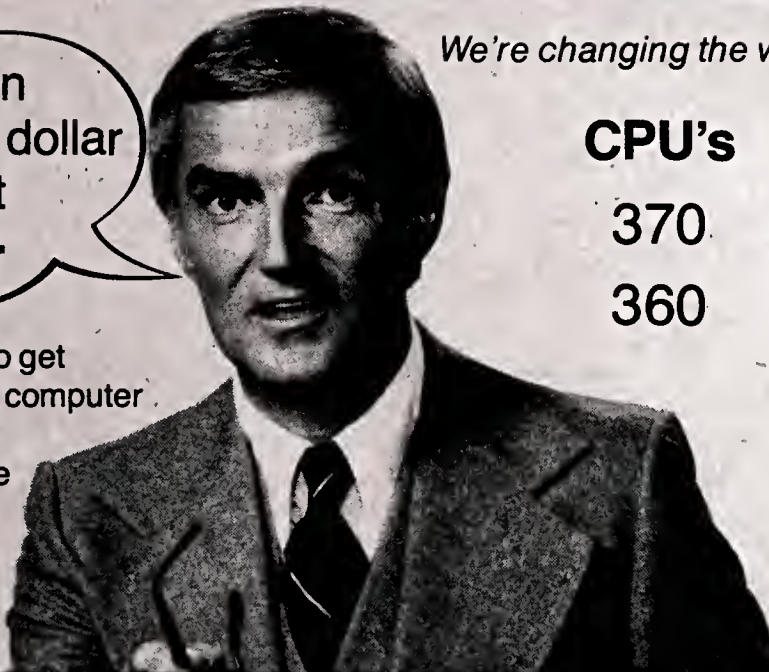
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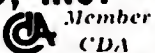


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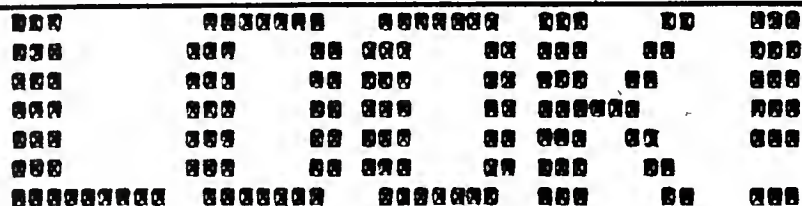
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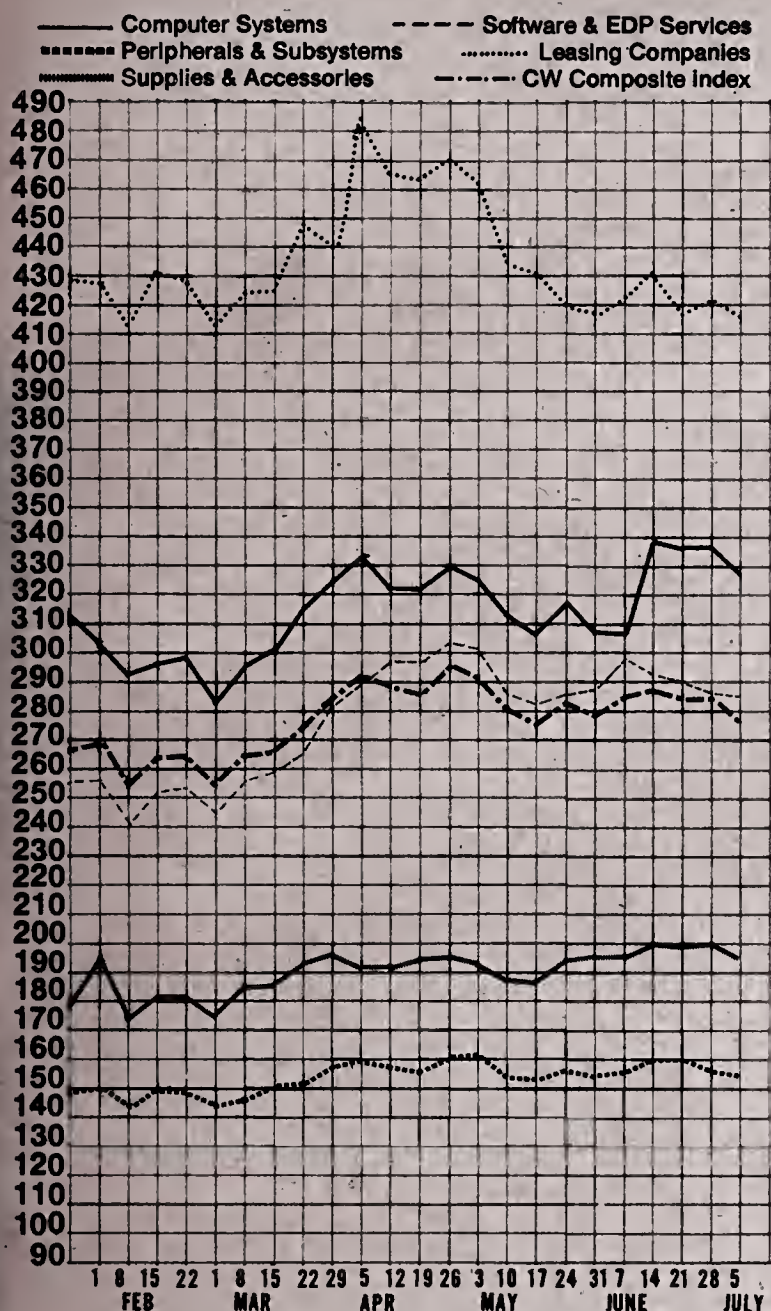
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# Earnings Reports

**NATIONAL SEMICONDUCTOR**  
 Year Ended May 31

|          | 1979        | 1978        |
|----------|-------------|-------------|
| Shr Ernd | \$2.57      | \$1.72      |
| Ravanua  | 719,740,000 | 494,338,000 |
| Earnings | 34,282,000  | 22,49T,000  |
| 3 Mo Shr | .73         | .48         |
| Ravanue  | 200,985,000 | 133,226,000 |
| Earnings | 9,820,000   | 8,339,000   |

**ON-LINE SYSTEMS**  
Year Ended April 30

|          | 1979       | 1978       |
|----------|------------|------------|
| Shr Ernd | \$1.80     | a\$1.24    |
| Revenue  | 29,249,683 | 22,818,507 |
| Earnings | 2,188,501  | 1,643,676  |
| 3 Mo Shr | .45        | a.38       |
| Revenue  | 7,891,533  | 6,383,779  |
| Earnings | 822,284    | 507,357    |

a-Adjusted for a three-for-two stock split paid in November 1978.

**DATARAM**  
**Year Ended April 30**

|          | 1979         | 1978         |
|----------|--------------|--------------|
| Shr Ernd | 4.51         | a4.2T        |
| Ravanua  | \$18,534,000 | \$15,605,000 |
| Earnings | 2,331,000    | 2,226,000    |
| 3 Mo Shr | 1.58         | a1.08        |
| Ravanua  | 5,170,000    | 3,684,000    |
| Earnings | 816,000      | 55T,000      |

a-Adjusted for 10% stock dividend paid in June 1978.

**MICRODATA CORP.**  
Three Months Ended May 31

|          | 1979       | 1978       |
|----------|------------|------------|
| Shr Ernd | \$50       | \$53       |
| Ravenua  | 24,870,000 | 19,110,000 |
| Earnings | 1,150,000  | 1,178,000  |
| 9 Mo Shr | 1.80       | 1.25       |
| Revenue  | 69,488,000 | 44,516,000 |
| Earnings | 4,094,000  | 2,798,000  |

DECISION DATA COMPUTER  
13 Weeks Ended June 2

|             | 1979         | 1978        |
|-------------|--------------|-------------|
| Shr Ernd    | \$ .03       | \$ .11      |
| Revanua     | \$10,167,000 | \$9,297,000 |
| aExtrd Cred | 35,000       | 214,000     |
| Earnings    | 127,000      | 399,000     |
| 27 Week Shr | .0T          | .14         |
| Ravanue     | 19,814,000   | 17,525,000  |
| aExtrd Cred | 128,000      | 300,000     |
| Earnings    | 299,000      | 531,000     |

a-From tax-loss carryforward.

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# Computerworld Stock Trading Summary

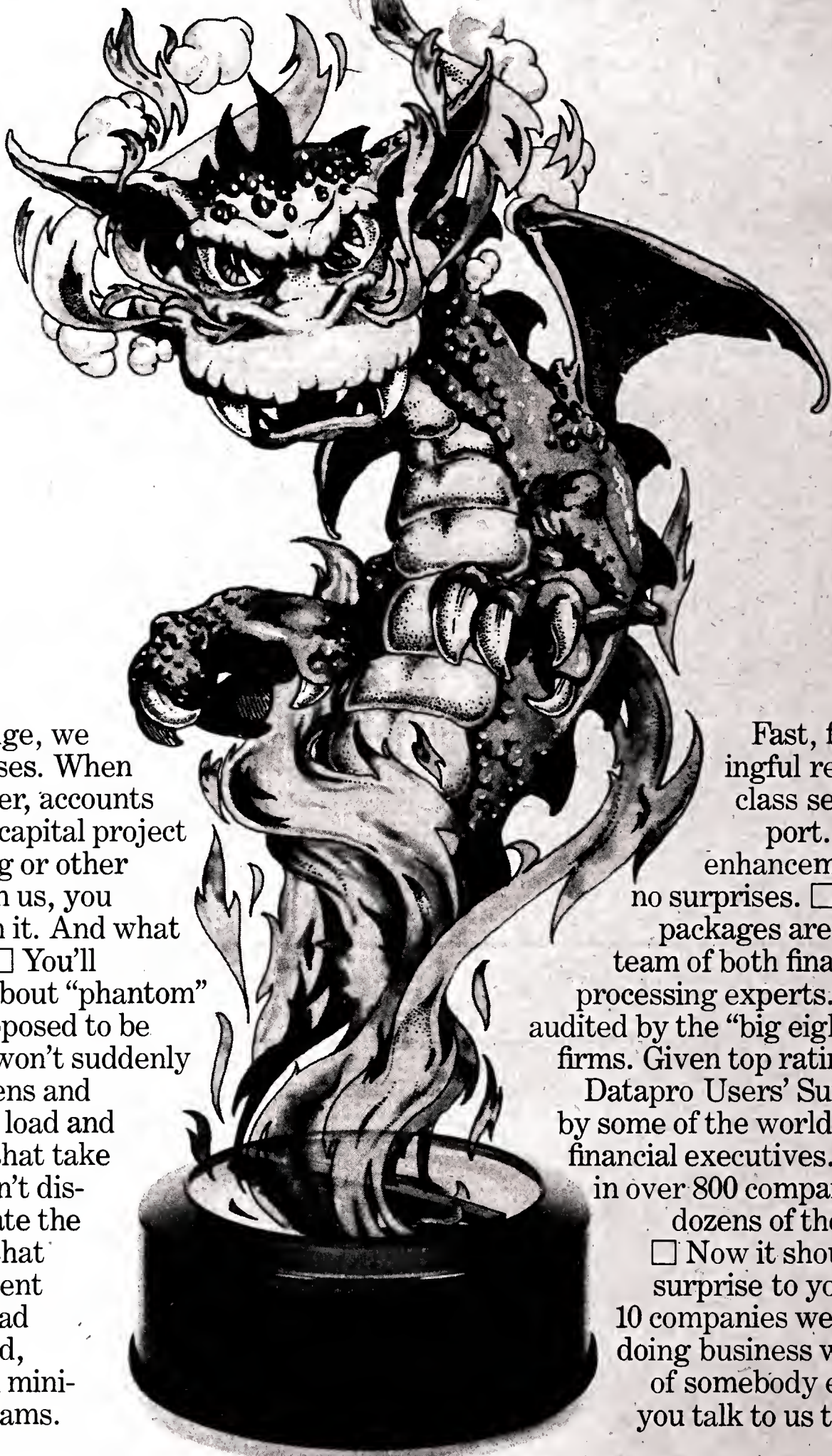
CLOSING PRICES TUESDAY, JULY 3, 1979

All statistics compiled,  
computed and formatted  
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Cambridge, Mass. 02139

| E<br>X<br>C<br>H | PRICE                   |                         |                      |                      |       | E<br>X<br>C<br>H        | PRICE                   |                         |                      |                      |       | E<br>X<br>C<br>H    | PRICE                   |                         |                      |                      |       | E<br>X<br>C<br>H |
|------------------|-------------------------|-------------------------|----------------------|----------------------|-------|-------------------------|-------------------------|-------------------------|----------------------|----------------------|-------|---------------------|-------------------------|-------------------------|----------------------|----------------------|-------|------------------|
|                  | 1978-79<br>RANGE<br>(1) | CLOSE<br>JUN 27<br>1979 | WEEK<br>NET<br>CHNGE | WEEK<br>PCT<br>CHNGE |       |                         | 1978-79<br>RANGE<br>(1) | CLOSE<br>JUN 27<br>1979 | WEEK<br>NET<br>CHNGE | WEEK<br>PCT<br>CHNGE |       |                     | 1978-79<br>RANGE<br>(1) | CLOSE<br>JUN 27<br>1979 | WEEK<br>NET<br>CHNGE | WEEK<br>PCT<br>CHNGE |       |                  |
| COMPUTER SYSTEMS |                         |                         |                      |                      |       | SOFTWARE & EOP SERVICES |                         |                         |                      |                      |       | DATA ACCESS SYSTEMS |                         |                         |                      |                      |       |                  |
| A                | AMOAHM CORP             | 23-69                   | 25 5/8               | -7/8                 | -3.3  | O                       | ADVANCED COMP TECH      | 1-2                     | 1 1/2                | 0                    | 0.0   | A                   | DATA ACCESS SYSTEMS     | 0-10                    | 9                    | 0                    | 0.0   |                  |
| N                | BURROUGHS CORP          | 59-87                   | 69 1/4               | -1 3/8               | -1.9  | O                       | ANACOMP INC             | 8-22                    | 15 1/4               | 0                    | 0.0   | A                   | DATA PRODUCTS CORP      | 13-25                   | 15                   | +1/4                 | +1.6  |                  |
| O                | COMPUTER AUTOMATION     | 11-44                   | 11                   | -2 1/2               | -18.5 | A                       | APPLIED DATA RES.       | 8-17                    | 9 3/8                | -1 1/8               | -10.7 | O                   | DATA INC                | 2-6                     | 3 1/8                | 0                    | 0.0   |                  |
| N                | CONTROL DATA CORP       | 23-44                   | 39                   | -5/8                 | -1.5  | N                       | AUTOMATIC DATA PROC     | 24-36                   | 32 1/2               | -1/4                 | -0.7  | O                   | DECISION DATA COMPUT    | 2-6                     | 3 1/4                | -3/8                 | -10.3 |                  |
| O                | CRAY RESEARCH INC       | 8-39                    | 35                   | -1                   | -2.7  | O                       | COMPU-SERV NETWORK      | 5-16                    | 14                   | -1 1/4               | -8.1  | O                   | DELTA DATA SYSTEMS      | 1-1                     | 5/8                  | 0                    | 0.0   |                  |
| N                | DATA GENERAL CORP       | 42-74                   | 66 5/8               | -2 3/8               | -3.4  | O                       | COMPUTER HORIZONS       | 1-9                     | 4 1/4                | 0                    | 0.0   | A                   | OCCUPATION INC          | 6-34                    | 22 1/4               | -1 1/8               | -4.8  |                  |
| N                | DATAPoint CORP          | 34-82                   | 73                   | -3 1/4               | -4.2  | O                       | COMPUTER NETWORK        | 5-16                    | 7 3/4                | -1/8                 | -1.5  | O                   | OATARAM CORP            | 6-32                    | 18                   | +1                   | +5.8  |                  |
| N                | DIGITAL EQUIPMENT       | 39-58                   | 54 5/8               | -2 1/2               | -4.3  | N                       | COMPUTER SCIENCES       | 8-17                    | 11 5/8               | -1/2                 | -4.1  | N                   | ELECTRONIC M & M        | 3-9                     | 4                    | +1/8                 | +3.2  |                  |
| N                | ELECTRONIC ASSOC.       | 2-13                    | 6 1/4                | -1/8                 | -1.9  | O                       | COMPUTER TASK GROUP     | 1-7                     | 7 1/2                | 0                    | 0.0   | O                   | FABRI-TEK               | 1-2                     | 3/4                  | -1/4                 | -29.4 |                  |
| A                | ELECTRONIC ENGINEER.    | 9-19                    | 10 1/2               | -7/8                 | -7.6  | O                       | COMPUTER USAGE          | 2-4                     | 2 1/4                | +1/8                 | +5.8  | O                   | GENERAL COMPUTER SYS    | 1-3                     | 2 1/8                | 0                    | 0.0   |                  |
| N                | FOUR-PHASE SYSTEMS      | 19-46                   | 33                   | -1 1/4               | -3.6  | O                       | COMPUT AUTO REP SVC     | 4-10                    | 7 3/8                | +1/8                 | +1.7  | O                   | GENERAL OATACOMM INC    | 9-21                    | 16 1/2               | -1                   | -5.7  |                  |
| N                | FOXBORO                 | 28-40                   | 38                   | +2 3/8               | +6.6  | O                       | COMSHARE                | 6-26                    | 20 1/4               | -2                   | -8.9  | N                   | HAZELTINE CORP          | 10-17                   | 15 1/8               | +7/8                 | +6.1  |                  |
| O                | GENERAL AUTOMATION      | 7-26                    | 12 1/2               | -1 1/8               | -8.2  | O                       | CULLINANE CORP          | 14-33                   | 20                   | 0                    | 0.0   | N                   | HARRIS CORP             | 17-36                   | 27 1/2               | -1 1/4               | -4.3  |                  |
| O                | GRI COMPUTER CORP       | 1-3                     | 1 1/4                | 0                    | 0.0   | O                       | DATA DIMENSIONS INC     | 3-9                     | 2 1/2                | 0                    | 0.0   | O                   | INFOREX INC             | 5-11                    | 5 1/2                | +1/2                 | +10.0 |                  |
| N                | HEWLETT-PACKARD CO      | 62-98                   | 96                   | -3/4                 | -0.7  | O                       | DATATAB                 | 1-4                     | 2 3/4                | 0                    | 0.0   | O                   | INFORMATION INTL INC    | 7-12                    | 9                    | 0                    | 0.0   |                  |
| N                | HONEYWELL INC           | 43-76                   | 68 3/8               | -1                   | -1.4  | N                       | ELECTRONIC DATA SYS.    | 15-25                   | 24                   | +5/8                 | +2.6  | O                   | INFOTON                 | 1-3                     | 2 7/8                | +1/8                 | +4.5  |                  |
| N                | IBM                     | 72-321                  | 72 3/8               | -1 1/8               | -1.5  | O                       | INSYTE CORP             | 1-3                     | 1 1/4                | 0                    | 0.0   | O                   | INTEL CORP              | 26-52                   | 51 1/4               | -1/4                 | -0.4  |                  |
| O                | MANAGEMENT ASSIST       | 9-29                    | 16 5/8               | -2 1/8               | -11.3 | O                       | IPS COMPUTER MARKET.    | 2-3                     | 3                    | 0                    | 0.0   | O                   | INTERFIL                | 7-18                    | 15 5/8               | -1                   | -6.0  |                  |
| O                | MANUFACTURING DATA S    | 9-26                    | 25 1/2               | -3/4                 | -2.8  | O                       | KEANE ASSOCIATES        | 3-6                     | 4 3/4                | 0                    | 0.0   | A                   | LUNOY ELECTRONICS       | 4-8                     | 6 3/4                | +1/4                 | +3.8  |                  |
| O                | MICRODATA CORP          | 10-31                   | 30                   | +3/4                 | +2.5  | O                       | KEYDATA CORP            | 1-4                     | 3                    | 0                    | 0.0   |                     |                         |                         |                      |                      |       |                  |
| O                | MINI-COMPUTER SYST      | 4-8                     | 4 3/4                | 0                    | 0.0   | A                       | LOGICOM                 | 10-19                   | 13 5/8               | +1/8                 | +0.9  | O                   | MSI DATA CORP           | 7-19                    | 7 3/8                | -7/8                 | -10.6 |                  |
| O                | MODULAR COMPUTER SYS    | 7-18                    | 12 1/8               | -7/8                 | -6.7  | A                       | NATIONAL CSS INC        | 15-48                   | 47 3/4               | 0                    | 0.0   | N                   | MEMOREX                 | 27-59                   | 30 1/2               | +2 1/4               | +7.9  |                  |
| N                | MCR                     | 37-72                   | 65 3/4               | -1/2                 | -0.7  | O                       | NATIONAL DATA CORP      | 7-13                    | 11 1/2               | +7/8                 | +8.2  | N                   | MOHAWK DATA SCI         | 6-15                    | 10 5/8               | 0                    | 0.0   |                  |
| N                | PRIME COMPUTER INC      | 9-22                    | 15 1/2               | -1 1/2               | -8.8  | A                       | ON LINE SYSTEMS INC     | 12-30                   | 21 1/4               | -1/8                 | -0.5  | O                   | OMEX                    | 2-8                     | 6 1/2                | 0                    | 0.0   |                  |
| N                | PERKIN-ELMER            | 17-34                   | 28 7/8               | -7/8                 | -2.9  | N                       | PLANNING RESEARCH       | 4-10                    | 5 7/8                | +1/8                 | +2.1  | O                   | PARADYNE CORP           | 9-18                    | 17 3/8               | +1/2                 | +2.9  |                  |
| N                | SPERRY RANO             | 33-51                   | 45 1/8               | -1/2                 | -1.0  | O                       | PROGRAMMING & SYS       | 1-1                     | 1 1/4                | 0                    | 0.0   | O                   | PENRIL CORP             | 5-12                    | 10 7/8               | -1/4                 | -2.2  |                  |
| A                | SYSTEMS ENG. LABS       | 11-24                   | 12 1/8               | +5/8                 | +5.4  | O                       | RAPIDATA INC            | 3-7                     | 4 7/8                | -1/8                 | -2.5  | N                   | PERTEC CORP             | 8-17                    | 8 3/4                | -1/2                 | -5.4  |                  |
| O                | TANDEM COMPUTERS INC    | 13-37                   | 29 1/2               | -1                   | -3.2  | O                       | REYNOLDS & REYNOLD      | 18-36                   | 28 1/4               | -1/2                 | -1.7  | A                   | POTTER INSTRUMENT       | 2-2                     | 1 3/4                | 0                    | 0.0   |                  |
| A                | WANG LABS.              | 6-22                    | 18 3/4               | -1 1/2               | -7.4  | O                       | SCIENTIFIC COMPUTERS    | 3-9                     | 6 1/2                | -1/8                 | -1.8  | O                   | RECOGNITION EQUIP       | 7-13                    | 6 3/4                | -1/4                 | -3.5  |                  |
|                  |                         |                         |                      |                      |       | N                       | TYMSHARE INC            | 18-41                   | 34                   | -1/2                 | -1.4  | O                   | SCAN DATA               | 1-5                     | 1 7/8                | -                    | -3.1  |                  |
|                  |                         |                         |                      |                      |       | A                       | URS SYSTEMS             | 5-8                     | 5 3/4                | +1/4                 | +4.5  | N                   | STORAGE TECHNOLOGY      | 17-46                   | 17 1/2               | +1/8                 | +0.7  |                  |
|                  |                         |                         |                      |                      |       | N                       | WYLY CORP               | 1-7                     | 5 5/8                | -1/8                 | -2.1  | O                   | T BAR INC               | 11-22                   | 16 3/4               | -1/2                 | -2.8  |                  |
|                  |                         |                         |                      |                      |       |                         |                         |                         |                      |                      |       | O                   | TALLY CORP.             | 4-14                    | 12 3/4               | +1/4                 | +2.0  |                  |
|                  |                         |                         |                      |                      |       |                         |                         |                         |                      |                      |       | A                   | TEC INC                 | 6-13                    | 6 3/8                | -1/4                 | -3.7  |                  |
|                  |                         |                         |                      |                      |       |                         |                         |                         |                      |                      |       | N                   | TEKTRONIX INC           | 33-57                   | 52 1/2               | +3/4                 | +1.4  |                  |
|                  |                         |                         |                      |                      |       |                         |                         |                         |                      |                      |       | N                   | TELEX                   | 3-9                     | 5                    | +3/8                 | +8.1  |                  |
|                  |                         |                         |                      |                      |       |                         |                         |                         |                      |                      |       | O                   | TESOATA SYSTEMS CP      | 9-26                    | 13 3/4               | -1/4                 | -1.7  |                  |
|                  |                         |                         |                      |                      |       |                         |                         |                         |                      |                      |       | O                   | WILTEK INC              | 1-2                     | 5/8                  | -1/8                 | -16.6 |                  |
|                  |                         |                         |                      |                      |       |                         |                         |                         |                      |                      |       |                     |                         |                         |                      |                      |       |                  |
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